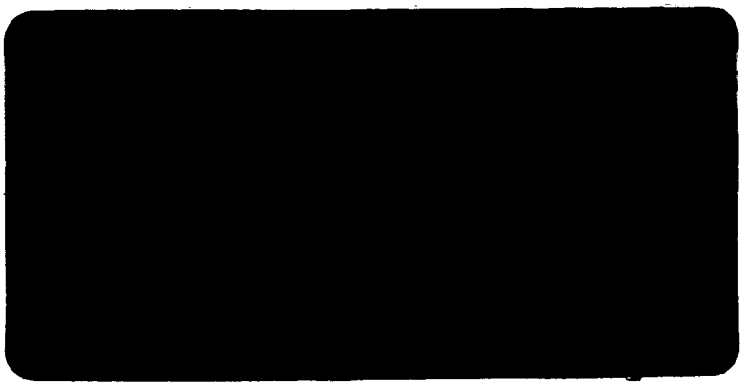

TRANSPORTATION

TERA AND ECONOMIC RESEARCH ASSOCIATES, INC.

2849 MEADOW VIEW RD., FALLS CHURCH, VA. 22042
(703) 698-7400

SAGINAW RIVER PORT

DEVELOPMENT STUDY

PHASE I REPORT

Submitted to:

Bay County Planning Division
912 N. Adams Street
Bay City, Michigan 48706

June 27, 1980

Prepared by:

Transportation and Economic Research Associates, Inc.
2849 Meadow View Road
Falls Church, Virginia 22042
(703) 698-7400

and

Johnson, Johnson & Roy/inc.
303 North Main Street
Ann Arbor, Michigan 48104
(313) 662-4457

This report was funded in part through financial assistance provided by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, United States Department of Commerce, through funds provided under the Coastal Zone Management Act of 1972 (PL 92-583); and administered by the Michigan Department of Natural Resources Division of Land Resources Programs.

TRANSPORTATION
TERA AND ECONOMIC RESEARCH ASSOCIATES, INC.
WASHINGTON, D.C. • LOS ANGELES • OAK RIDGE

June 27, 1980

Mr. Lawrence C. Hall, Head
Bay County Planning Division
912 North Adams Street
Bay City, Michigan 48706

Dear Mr. Hall:

We are pleased to transmit herewith the final report of the Saginaw River Port Development Study, Phase I, prepared by TERA and Johnson, Johnson & Roy.

The purpose of this study was to identify the long-term need for commercial, industrial and recreational use of the river, in order to provide planning guidance and criteria for the study's sponsors. To this end, river-related demands have been analyzed in depth. We believe our port traffic forecasts are realistic, and we have identified growth opportunities for both commercial and recreational facilities. We believe these can be accommodated in a balanced program for river and waterfront development.

Our intent was to recognize the interests of all the entities sponsoring this study: Bay, Saginaw and Midland Counties, Bay City, Michigan Department of Transportation, and Michigan Department of Natural Resources. In the performance of this study, your area has become a never-to-be forgotten part of our lives.

Our wish is that this study will have an equally long lasting and beneficial effect on yours.

Sincerely,

Asil Gezen, Ph.D.
President

AG/cw

Encl.

2849 MEADOW VIEW ROAD • FALLS CHURCH, VIRGINIA 22042 • (703) 698-7400

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INTRODUCTION

The Saginaw River is one of the natural assets of Bay and Saginaw Counties. As a transportation artery it was a key factor in the location and growth of the urban centers, Bay City and Saginaw. Increasingly, its recreation potential is being recognized and realized. At present, the river is of considerable commercial and recreational importance, not only to the two counties, but to the region specifically including Midland County—as well as Michigan and the United States.

Commerce and recreation need not be mutually exclusive uses of a waterway, but the supporting shoreside facilities that they require are competitive land uses. Land, or more specifically shoreline, is a finite resource because man-made improvements can expand the shoreline or extend a waterway only to a limited degree. In recognition of this, Congress passed the Coastal Zone Management Act of 1972 and subsequent admendments. The stated purpose of that Act is to"...preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." The Act provides a vehicle for resolving land use conflicts. What it does not do is dictate land use priorities.

In many respects, the Saginaw River provides a classic setting for coastal zone management. Waterfront use ranges from underutilization through a variety of uses, some of which may not be the highest and best use. Individually,the counties have adopted development plans, the municipalities have prepared or adopted land use plans—but heretofore they have not approached waterfront land use on a multi-county integrated system basis. The Coastal Zone Management Act was timely in recognizing the

limitations of local planning and zoning for a resource that is of more than local concern. Although it leaves the burden of decision-making, negotiations, and appeals to the local authorities, it does provide "Section 306" funding to assist in plan implementation.

This study has been funded by a Section 306 grant administered by the Michigan Department of Naural Resources. The study was sponsored by Bay, Saginaw and Midland Counties, and Bay City. Mr. Lawrence C. Hall, Head of the Bay County Planning Division was the study coordinator, and provided local liaison. The study was performed by Transportation and Economic Research Associates, Inc. (TERA), of Arlington, Virginia, and Johnson, Johnson & Roy/inc. (JJR) of Ann Arbor, Michigan. Assistance in the study was provided by all of the aforementioned agencies, and Michigan Department of Transportation.

TERA and JJR gratefully achnowledge the assistance received. The purpose of this study was to determine the long-term need for commercial, industrial, and recreational use of the Saginaw, in order to identify development opportunities and design an integrated development plan. Our intent was to provide a plan with an appropriate balance of commercial and recreational uses, consistent with good coastal zone management practices.

I. SUMMARY AND CONCLUSIONS

The purpose of this study was to determine the long-term need for commercial, industrial, and recreational use of the Saginaw River, in order to identify development opportunities and devise an integrated development plan that provides an appropriate balance of commercial and recreational uses.

As a preface to demand analysis, this study has reviewed the Federal Port Project - the federal-local partnership whereby the Saginaw has been canalized over the years for commercial navigation. This dredging of the river has been going on for 114 years. The cost of dredging has risen dramatically over the past decade because of dredged material disposal requirements. Other studies have identified the need for a new mid-river disposal area. This study notes that the federal government may require local cost-sharing of the dredging and/or spoil disposal. Alternately, maintenance of the Saginaw project by the Corps of Engineers may be reduced.

This study's findings are enumerated in the Port Project chapter. It's recommendations based thereon are:

(1) An acquisition program to provide a site for a new dredged material disposal area for river maintenance dredging should be initiated promptly. This should be part of a continuing program to identify and provide spoil disposal areas for future Bay and river maintenance and improvement dredging.

(2) Advocacy of Federal Project improvements is needed in order to assure the benefits of deeper channels. An immediate request for official study of the improvements identified in this study should be forwarded to the Corps of Engineers.

(3) A formal port organization is needed to provide project advocacy and initiative, and liaison between the Federal and local interests. The port organization/ port project sponsors should be Bay, Saginaw and Midland counties.

As a further preface to demand analysis, this study inventoried existing recreational and cargo facilities on the Saginaw. Overall, this inventory identified 14 significant recreational facilities including parks and marinas, and 34 cargo handling facilities. Relevant information on each facility is included.

The Commercial Development chapter of this report consolidates statistics for port traffic on the Saginaw, the Seaway, other Lakes ports and other U.S. ports. The hinterland analysis includes interviews with present and potential port users, and identified the hinterlands of specific categories of traffic for intensive analysis. After review of the competitive factors that reduce total hinterland potential traffic to actual, forecasts were made for major commodity categories.

The commodity forecasts indicate that tonnage could approximately double between 1980 and the 2000, to about 6,000,000 tons. That is predicated on successful promotional efforts to improve channel depths and provide additional grain, fertilizer, and pellet handling facilities. At that level, the Saginaw will have recovered to near its previous peak tonnage - 7.2 million tons in 1966. Between 2000 and 2020, the forecasts indicate that port tonnnage may more than double again, to over 16 million tons.

This study's findings are enumerated in the Commercial Development chapter. It's recommendations based thereon are:

(1) Any significant new investment in marine terminal facilities, if needed, should be made along the lower reach of the river, Bay City/Grand Trunk Western Bridge to Bangor/Essexville, because of the transportation economies from deeper water and better prospects for continued channel maintenance and improvement there.

(2) The deepwater reach of the river is and will be inadequate to accomodate all of the cargo facilities needed. Only the present rudimentary type of stone "docks" should be encouraged to remain or expand on the 22' deep section of the channel pending an official study of the feasibility of deeper water.

(3) A feasibility study of incremental channel deepening is recommended, along with more detailed economic feasibility studies of the new terminal facilities this study has identified as needed. Specifically, an export grain elevator, and a dry bulk materials terminal or terminals for feed exports and/or fertilizer receipts.

(4) Promotional efforts are needed to assure construction of new marine terminal facilities, and better utilization of existing facilities. The port organization needed for Port Project sponsorship would be equally valuable in port development. It should be created promptly.

The Recreational Development chapter of this report includes an inventory of actual land use along the river, and an inventory of land use plans by the dozen cities and townships involved. The Saginaw River corridor was divided into four separate activity zones in order to facilitate description of actual and planned recreation facilities. Recreational facility demand was analyzed on a regional, county and local level, and the indicated deficiencies or needs used to produce recreation framework plan.

The findings of the Recreational Development chapter are incorporated in its "Framework Plan". The principal recommendations of this chapter are:

(1) Based on forseeable need, phased construction should be initiated promptly for four small craft launching ramps (Essexville, south Bay City, Saginaw Veterans Memorial Park, and Saginaw City); two marinas (Essexville and Bay City Veterans Memorial Park); and two downtown transient small craft mooring facilities (Bay City and Saginaw City).

(2) There is an intermediate and long-term need to integrate the parks along the river into a water-oriented park system. Expansion of Defoe Park (Bay City) to the waterfront is recommended, to link with Veterans Memorial Park via the new marina. Fishing nodes, designated pathways and scenic overlooks are recommended for Saginaw's Veterans Memorial Park including extension of the pathway into Saginaw.

(3) A land acquisition program is recommended for new parks/recreation facilities at three locations: Skull Island woodlot area in south Bay City, the Zilwaukee riverfront, and Carrollton Bar, including access from Carrollton.

(4) Middle Ground and the Saginaw Bay Diked Disposal Facility should be developed as regional-scale, water-oriented recreation facilities, and planning for their long-term development should be initiated.

(5) Limitations on the expansion of three recreation facilities were recommended to minimize conflict with commercial development: expansion of the Essexville waterfront park was recommended eastward only, into adjacent vacant properties; major capital improvement should not be made at Bay City's Dow/Doer Field because of its strategic industrial location; and Bay City's Wastewater treatment plant park should be limited to a waterfront outlook.

The final chapter presents an Integrated Development Plan after review of the consultants' philosophy in the performance of this study, and the criteria used in resolving the conflicts between recreational and commercial uses of the river and waterfront.

The underlying philosophy of this report was to identify all port development opportunities, recreational as well as commercial, in order to identify growth constraints as well as conflicts in uses. The resulting number of recommendations for recreational and commercial facilities was the product of independent and thorough analysis. Numerically more recreation than commercial facilities were recommended. This reflects an even-handed appraisal of development opportunities.

In brief, the report was not designed to avoid conflicts of use by absence of growth. Neither did it deliberately create adversary situations by trying to fit all commercial and recreational activities into the two ends of the river that are most attractive for both. Based on this realistic approach, there were few use conflicts to resolve.

This study's recommendations for resolving conflicts between recreational and commercial uses are:

(1) Recreation facilities where commercial development is most intense (the 2.5 miles of river immediately downstream of the GTW bridge at Bay City, the 3.0 miles of river immediately downstream of the C&O bridge at Saginaw) should be limited to passive facilites that do not produce small craft traffic, but provide waterfront outlooks.

(2) Recreational facilities that do produce small craft traffic should be located closest to the Bay to minimize mixed recreational and commercial vessel traffic in the river channel (and minimize bridge openings). Alternately, the small craft facilities should be far enough upstream of commercial facilities to minimize mixing.

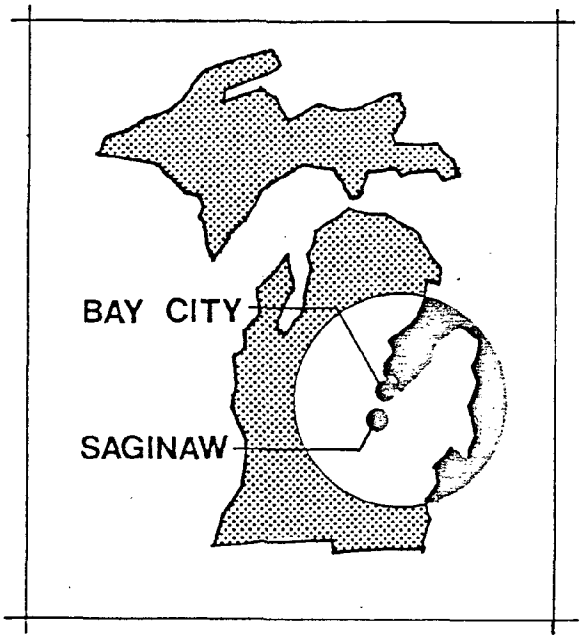
(3) The pattern of linear development of facilities and utilities along the river is an extravagant use of riverfrontage. Wherever possible, marinas should be built into basins, not out into the river or along it. The size of commercial vessels effectively precludes the use of slips and berths perpendicular to the river.

(4) Insofar as possible, commercial marine terminal facilities should be concentrated in the section of the river downstream of the GTW bridge at Bay City, to minimize bridge openings and disruption of overland traffic.

(5) The commercial and recreational development of the Saginaw should be coordinated through use of a bi-county, or preferably tri-county, port organization.

FIGURE I-1

STUDY AREA



II FEDERAL PORT PROJECT

The Saginaw River was an essential part of the early development of Bay, Saginaw and Midland counties. The river and its tributaries were, in fact, an integral part of the lumbering industry, providing transportation of logs to the mills, and transportation for the lumber to markets. To a considerable degree, the river still is a common asset of the three counties. It is also important to recognize that the Saginaw is an integral part of the U.S. port system. The strengths of the national port system - and its challenges - are also those of the ports on the Saginaw.

U.S. Port System

The U. S. port system is a combination of local investment in port facilities and federal investment in harbor and waterway improvements. It combines the initiative of local interests with water resource development disciplines intended to reflect the national interest. There is some federal concern that local initiative has produced an overbuilt system, matched by local concern in most port communities over the adequacy of local facilities and channels. Those concerns should be viewed in the context that the U.S. has the preeminent port system in the world. It is a national port system that is singularly responsive and competitive. The competitive aspects of the system are significant in two ways:

- Competition for Business. Most port communities perceive their ports as economic development centers. With or without formal port organizations, most have some programs to attract cargos from other ports, or encourage water-related industry. The regulatory atmosphere in transportation encourages port versus port competition.
- Competition for Federal Funds. For most of U.S. history,

> the value of navigation improvements to transportation and economic development has been unquestioned. For most of that period, starting in 1824, the cost of navigation improvements was relatively modest. In the last 50 years, the cost of navigation improvements has grown significantly along with growth in vessel size. In the last 15,years costs have grown tremendously because of inflation and environmental considerations. At the same time, there has been a dramatic increase in other federal programs and a change in development priorities. This has increased competition for federal project funds.

The effect of the above has been to accentuate the difference in growth rates of different ports. Those that have had aggressive sponsors have increased business - and federal improvements that encouraged more business - measurably. This is particularly true in those regions with a tradition of strong port sponsorship, particularly the south and west. The effect of competition is equally applicable to recreational as well as commercial development, hence the federal "port" project is addressed early on in this study

The Authorizations - Appropriations Process

The Corps of Engineers project procedures provide the forum for interaction between local interests and the federal government. Approximately 30 steps are involved between conception and completion of new projects - or modification of existing projects such as widening and deepening of channels. They are:

1. Recognition of Need. In the past, the Corps frequently initiated studies. Now, the initiative is essentially local.
2. Study Request. Most studies require action by Congress, but not necessarily an Act of Congress. Typically, a resolution by the House Public Works Committee requesting a study will suffice. This involves:

   (1) Identification of the problem or need
   (2) Conceptualizing the solution

(3) Enlisting a Congressman to support the required resolution.
(4) Convincing the Committee to pass the required resolution.

Alternately, and particularly in the case of large or controversial studies, the study request may be incorporated in a Water Resources (Public Works) Authorization bill. These used to be biennial. A sign of the times: There hasn't been a Water Resources Authorization Bill passed since 1977.

3. Study Management. After Congressional action - request resolution or authorization by law - it must be acted upon by the Secretary of the Army. He directs the Chief of Engineers to conduct the study, and the study is directed down through the Division Engineer's office to the District Engineer's office (Chicago and Detroit, respectively for the Saginaw project) where it is performed.

4. Study Funding. The Corps has a modest fund for initiating small or urgent studies. Most studies have to be worked into the Corps' budgets at the District, Division, and national levels, and eventually included in the annual appropriations bill for Energy and Water Resources.

   (1) Corps budget priorities reflect local initiative. Also the Administration's priorities exercised via OMB
   (2) Congressional budget priorities reflect many factors including budget limits and budget cuts.

5. Study Procedure. The analysis by the District Engineer's office goes through successive levels of refinement alternating with public hearings. Large or controversial projects may involve many more analyses and hearings. Most involve:

   (1) Initial public hearing, to identify the problem and acceptable solutions
   (2) Preliminary feasibility study, environmental assessment and feasible solutions
   (3) Formulation stage public hearing, to discuss the most feasible solutions
   (4) Draft feasibility report and draft environmental impact statement based on detailed technical analysis
   (5) Late stage public hearing(s), to discuss proposed plan and/or EIS

6. Study Review. The feasibility report and EIS are forwarded to appropriate state and federal agencies for review, and the public is invited to comment. A negative comment or failure to comment by any of the agencies normally stalls the study. When all approvals are in hand, and after review of comments, the District Engineer prepares (a) a final feasibility report (b) a revised draft EIS, and (c) a statement of findings. These are reviewed, may be modified, and require the approval of the following, in the order shown:

   (1) Division Engineer - technical review
   (2) Board of Engineers for Rivers and Harbors - technical review, agency and public input
   (3) Chief of Engineers - requests, comments by state and local agencies
   (4) Water Resources Council - cost/benefit evaluation
   (5) Office of Management and Budget - policy (political) evaluation
   (6) Secretary of the Army - final feasibility report, EIS and statement of findings transmitted to Congress.

   Any of the above steps may involve more public hearings, and negotiations with state and federal agencies.

7. Project Authorization. An Act of Congress (law) is required to make any waterway improvement official. In the distant past, this used to occur in an orderly fashion via the Administration's version of the "Rivers and Harbors" (public works) bill. This was based on the Corps' estimate of the work that could be handled by available equipment (Corps and Contractor) and need. In the past 20 years, the Administrations - Republican and Democrat - have proposed very few new navigation projects. About 90% of those approved have been introduced by Congressmen.

8. Project Sponsorship. During the feasibility analysis, it is customary to define the obligations of the "local project sponsor." Traditionally these have included providing the following free of charge to the U.S.:

   (a) Channel rights-of-way
   (b) Spoil disposal areas

(c) Utility relocations as necessary.

In recent years the local obligations have tended to expand, especially:

(d) Spoil disposal area dikes
(e) Cost sharing via contributions to new or maintenance work.

Usually after project authorization and before any work is funded; these local obligations have to be guaranteed by contract. Bay City has done so for the Middleground spoil disposal area. Bay County has done so for the Saginaw Bay spoil disposal island.

9. Project Funding. Rarely is a project funded "once-and-for-all." The budget process described in #4 applies to:

(1) Project planning and/or
(2) Project design (they may be combined)
(3) Project construction

The Federal appropriations process is on a year-by-year basis. Since planning, design and especially construction take more than a year for most projects, the budget process has to be repeated as necessary. In addition, the planning and design phases may produce more public hearings and project modifications.

Project modifications may require a reauthorization - by another Act of Congress. Also, in many projects, Congress has deliberately required Phase I and II authorizations - the latter required after completion of design when cost estimates are final.

Typically, all projects "age" for a period after authorization and before planning, design or construction is funded. Historically the Administration's budget would include some of these "new starts." Since 1976 it hasn't proposed any. In the past 20 years, about 98% of "new start" funding has been inserted by Congress.

10. Project Completion. The process described above usually requires a minimum of five years from conception to project completion. Many authorized projects never get funded. Because of this, the Corps and Congress have undertaken to "deauthorize" projects

that have been inactive, rule-of-thumb, 20 years. Due to the deauthorizations, the average time between project conception and completion has been reduced to about 18 years!

Most projects are never complete, in that they require maintenance. Historically, completion of authorized new work implied that the project would then be maintained as necessary. Increasingly this has not been the case, due to budget limitations.

The funding of maintenance differs from "new work." Although the Corps' "O&M" budget reflects line items for specific projects, it is handled as a whole. When there is an appropriations shortfall, it is up to the Corps to set priorities on which projects are fully maintained, i.e., there is no value in dredging all ports 75%. The Corps' priority setting is based on logic -- maintaining the most active ports -- and politics -- the ports that complain most effectively, not necessarily the loudest.

Maintenance funding shortfalls are a relatively new but growing phenomenon. Because of this, there is increasing pressure to apply the disciplines that apply to new work -- cost/benefit evaluation, feasibility and environmental analysis -- to maintenance work.

Most readers are generally aware of the interaction between local interests and federal government on navigation projects. The above illustrates the importance of active project sponsorship.

Saginaw Project History

The original Federal project for the improvement of Saginaw River was authorized by the River & Harbor Act of June 23, 1866. It provided for dredging a channel 195' wide and 12' deep through a sand bar in Saginaw Bay at the mouth of the Saginaw River. Modification in 1882 provided for dredging a channel 14' deep from Saginaw Bay to Bay City, thence 12' to Saginaw. Subsequent reports and actions undertaken are as follows:

Year of Report	Work Considered	Congressional Document	Recommendations	Action Taken By Congress
1910	Deepening channel to 16½ feet in Saginaw River and Saginaw Bay	H. Doc. 740, 61st Congr., 2nd Session	Favorable	Authorized by R&H Act of 25 June 1910
1924	Request for 21-foot channel throughout river	Not printed	Unfavorable	---
1928	Extending 18½ foot channel to Essexville and 16½ foot channel upstream to Green Point	H. Doc. 173, 70th Congr., 1st Session	Favorable	---
1930	Extending 18' foot channel to Sixth St. bridge in Saginaw	R&H Comm. Doc. 30, 71st Congr., 2nd Session	Favorable	Authorized by R & H Act of 3 July 1930
1934	Request for a turning basin in Bay City	Not printed	Unfavorable	---
1937	Constructing a turning basin 15 feet deep between Bristol St. and Court St. bridges in Saginaw	R&H Comm.Doc. 21, 75th Congr.	Favorable	Authorized by R&H Act of 26 Aug. 1937
1938	Deepen channel to 21 feet to D&M br. in Bay City and 20 feet to 6th St. bridge in Saginaw, all 200 feet wide	H. Doc. 576, 75th Congr., 3rd Session	Favorable	Authorized by R&H Act of 20 June 1938
1954	Dredging a new entrance channel in Saginaw Bay; deepening the river channel to Sixth St. bridge in Saginaw; and dredging two turning basins	H. Doc. 500, 83rd Congr., 2nd Session	Favorable	Authorized by R&H Act of 3 Sept. 1954

Year of Report	Work Considered	Congressional Document	Recom-mendations	Action Taken By Congress
1962	Deepening bay channel and river channel to D&M bridge; extending 22 foot project above 6th St. bridge; deepening Essexville turning Basin, and constructing two new turning basins (See par. 18, this report)	H. Doc. 544, 87th Congr., 2nd Session	Favorable	Authorized by R&H Act of 23 Oct. 1962
1965	Deepening channel through D&M bridge to downstream side of N. Central RR Bridge	H. Doc. 240, 89th Congr.	Favorable	Authorized by R&H Act of 27 Oct. 1965

The present federal project pursuant to the above authorization, is summarized in Table II-1.

TABLE II-1

SAGINAW RIVER CHANNEL DEPTHS

TABULATED FROM SURVEYS BY THE CORPS OF ENGINEERS--SURVEYS TO MAY, 1978

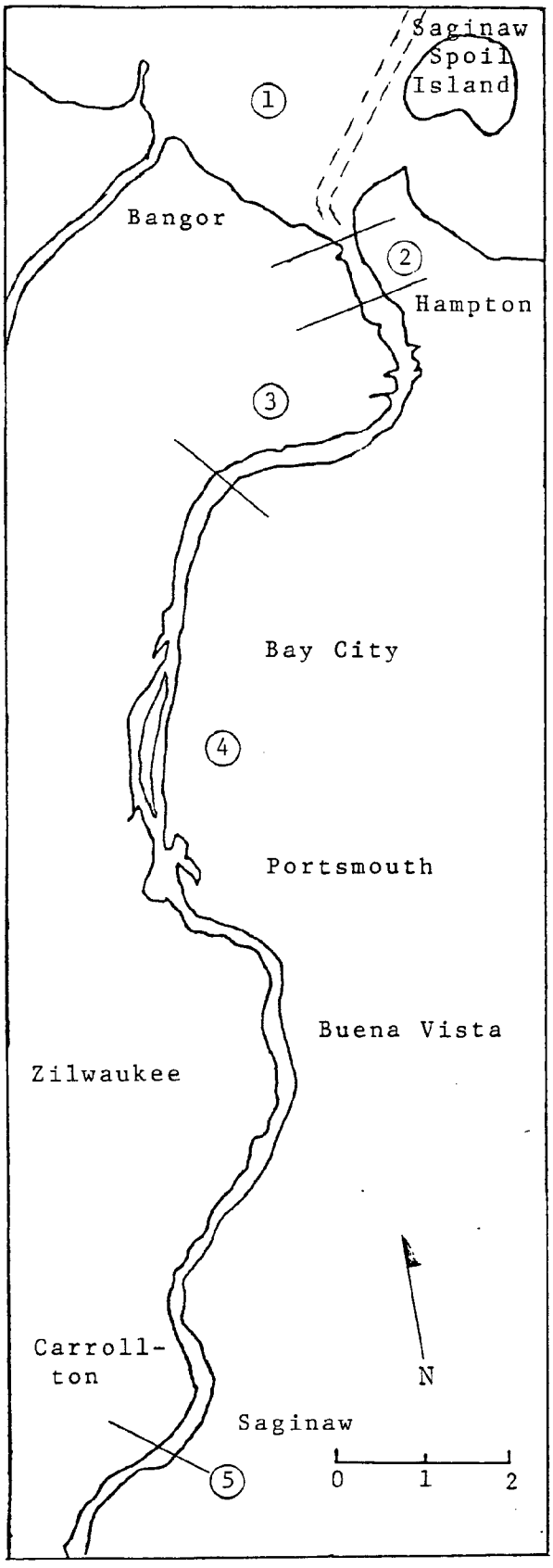
	CONTROLLING DEPTHS FROM SEAWARD IN FEET AT GREAT LAKES LOW WATER DATUM (LWD)				PROJECT DIMENSIONS		
NAME OF CHANNEL	LEFT OUTSIDE QUARTER	MIDDLE HALF OF CHANNEL	RIGHT OUTSIDE QUARTER	DATE OF SURVEY	WIDTH (FEET)	LENGTH (STAT. MILES)	DEPTH LWD (FEET)
ENTRANCE CHANNEL	14.5	17.5	15.5	6-77;5-78	350	13.70	27
THENCE TO BUOY 34	13.0	17.0	14.0	6-77;4-78	200	0.47	25
THENCE TO ESSEXVILLE TURNING BASIN	21.9	16.1	14.1	5-78;4-78	200	2.27	25
ESSEXVILLE TURNING BASIN	23.0	23.1	19.4	1.5-78	650	0.37	25
THENCE TO 6TH RR BRIDGE	19.9	18.7	21.9	9-77;4.5-78	200	2.05	25
THENCE TO AIRPORT TURNING BASIN	10.4	15.1	18.5	7-71;5-75	200	3.00	22
THENCE TO BUOY 54	11.7	20.0	16.9	7-76;12-77	200	3.20	22
THENCE TO INTERSTATE HWY 75 BRIDGE	19.0	21.2	16.0	7,8-76;4-78	200	2.75	22
THENCE TO 6TH ST TURNING BASIN	12.7	14.0	16.0	6-75;1,4-78	200	3.10	22
6TH ST TURNING BASIN	12.0	14.1	11.7	10-77	650	0.20	22
THENCE TO C&O RR BRIDGE	19.6	18.7	12.2	10-77	200	0.17	22
THENCE TO CARROL ST.	15.9	15.8	13.0	10-77	200	0.30	16

NOTE-CONSULT THE CORPS OF ENGINEERS FOR CHANGES SUBSEQUENT TO THE ABOVE INFORMATION

The federal channel from the Saginaw Bay Spoil Island to the Sixth Street Turning Basin in Saginaw approximates the study area and is shown on the following map. (Figure II-1)

FIGURE II-1

SAGINAW RIVER PROJECT



Channel Depths

1. Bay Channel 27'
2. Entrance Channel 26'
3. River Channel 25'
4. River Channel 22'
5. Head of Navigation

Significant Developments

Among the developments that have made the path to project authorization and funding longer and more difficult in recent years are:

- Dredged Material Disposal Requirements
- Increased Local Cost Sharing
- Changes in Evaluation Criteria
- Changes in Evaluation Techniques

Dredged Material Disposal

A Presidential Executive Order in 1969 placed a moratorium on the dumping of dredged material in the Great Lakes except for Lake Superior. In the years since, the moratorium has been superseded by the provisions of the Federal Water pollution and Control Act, specifically the "dredge and fill" regulations and guidelines that implement Section 404 of the FWPCA. The net effect of elimination of the moratorium has been minimal. Virtually all Lake ports have some degree of contamination that requires their dredging spoils to be contained. The exceptions are rare. The net effect of the imposition of "Section 404" is that all U.S. ports are treated more-or-less alike.

One result of the early prohibition of uncontained spoil disposal in the Great Lakes was a provision in the 1970 Water Resources authorizations legislation for "cost-shared" spoil dikes. The provision in Public Law 91-611 provided a waiver of local cost sharing if

specified pollution control measures were in force. Substantially all dikes needed by Lake ports have been built under this provision and waiver. The Public Law 91-611 authorization contemplated a ten-year diking program to cost an estimated $40 million. It anticipated that pollutants would be controlled during that period, and open water dumping could be resumed.

To date the Lakes program has cost about $250 million. The tidewater ports would like to have a similar program, but the cost overrun of Public Law 91-611 makes that unlikely. The spoil dike in Saginaw Bay was built under the provisions of 91-611, hence it was not shown in the listing of port project authorizations. The 287 acre diked area was built with a capacity of approximately 10 million cubic yards, more than adequate for a ten year life based on the local (Essexville) Corps of Engineers office's estimate of 500,000 cubic yards annual Bay dredging. Due to the accumulated siltation during the moratorium and dike construction, however, the Bay diked area is now approximately half full. It should be noted that under the provisions of 91-611 another Bay dike will not be automatically forthcoming.

Recently, the Bay dike has served as the receptacle for PCB contaminated sediments dredged in both Bay City and Saginaw areas. Dredged material from the Saginaw area is normally placed on Middle Ground, but that containment area was not built for zero discharge of effluent. Currently there is a study underway by the University of Michigan to determine the extent of and

solution to the PCB contamination problem, due to be completed in October 1981. In the meantime the long distance transport of spoil to the Bay Island has increased dredging costs and foreshortened the life of that facility.

The 12 acre Middle Ground disposal facility has a capacity of about 200,000 cubic yards. That is barely adequate for two years of river maintenance dredging based on the 100,000 to 150,000 cubic yards per year estimated by the local Corps of Engineers Office. Because most of the spoil deposited at Middle Ground has been removed for use in the adjacent Bay City solid waste landfill, the use of that spoil disposal facility has been greatly extended. The Bay City landfill has not been in compliance with State of Michigan sanitary landfill regulations for several years, and a study to determine a new location is underway. Preliminary indications are that none of the prospective landfill sites are located near the river where they could be used in conjunction with the spoil disposal facility. The useful life of the Middle Ground spoil disposal area is limited, and there is an immediate need to identify a new disposal area for river dredging. As noted below, the spoil area dikes may or may not be a local obligation.

Increased Local Cost Sharing

Historically, the local project sponsor has been required to bear certain costs that used to be minimal: provide right-of-ways, bear the cost of utility relocations, and provide spoil disposal areas if needed.

Until clean water legislation imposed diking requirements, most contracts between the federal government and local sponsors were silent on the dike costs. Until late 1978, it was presumed that the dikes were a federal expense unless the contract specified otherwise. In the past eighteen months the Corps of Engineers reversed that presumption and then reversed its position again.

In approximately that same time period, the Carter Administration has succeeded in legislating waterway user charges, and administratively has imposed a requirement for percentage cost sharing of project costs by local sponsors. User charges had been proposed by every administration since the 1930's. Regardless of its merits, it applies to improved waterways where there is traffic to bear it. So far it applies to specified inland waterways, but extension to coastal and Great Lakes ports is possible.

On the other hand, the cost sharing requirement involves an "up-front" contribution before the improvement is usable, of 5% or 10% of the estimated cost. This concept is new, and Congress has resisted it strenuously - to the point of delaying its biennial authorizations bill a year. In the meantime, the Office of Management and Budget will not approve any new authorization without the sponsor's "voluntary" contribution agreement. Absent that agreement and OMB approval, Congress can still authorize an improvement, but this invites a Presidential veto.

Changes in Evaluation Criteria

The benefit/cost evaluation process was developed originally as a method for setting priorities in water resource development. Increasingly the evaluation process has been seized upon as a device to impose priorities. The principles and standards for project evaluation now literally fill a book. The book is the product of the Water Resources Council, an executive agency. The latest revision of WRC's Manual of Procedures for evaluating port projects became available in May, 1980. No significant change is apparent in the revised criteria. Because of the sophistication of the evaluation process, however, it is increasingly difficult for local interests to determine or demonstrate project feasibility for a perceived need.

Changes in Evaluation Techniques

Project evaluation techniques are also increasing in sophistication. Some of these such as increasing the interest rate for discounting project benefits, and increasing the share of land enhancement recoverable from local interests (it went to 100% last October) adversely affect project feasibility. A development that is relevant and possibly helpful to the Saginaw project is evaluation of incremental dredging. In this case it would permit evaluation of all channel dredging alternatives to Saginaw and/or Bay City and keep all options open for the local interests.

Project Evaluation

Historically, project feasibility has been determined by obtaining an estimate of project cost amortization which can be compared with annualized benefits, typically for a specific improvement proposed by local interests. Incremental analysis expands the comparison to compare costs and benefits for incremental deepening throughout the channel and for parts of the channel only.

The calculation of estimated annualized costs and benefits for incremental improvement of the Saginaw is beyond the scope of this study. To provide some basis for estimating feasibility of Channel dredging, Table II-2 shows estimated costs for each additional foot of channel depth based on cost assumptions as follows: (per cubic yard)

• Dredging	- $1.25
• Hauling	- .75
• Placement	- 1.25
• Dikes	- 3.75
Total	$7.00

The cost estimates are used in Table II-3 to compare with estimated annual benefits from deeper channels and use of larger vessels as follows:

- Grain: Average 1990-2020 forecast (730,866 tons) at $4.00
- Stone: Average 1990-2020 forecast (2,536,853 tons) at $1.00
- Coal: 2020 forecast (9,110,324 tons) at $2.00. (Benefits do not apply in prior years)

TABLE II-2
ESTIMATED COSTS OF SAGINAW CHANNEL DREDGING
(PER FOOT OF ADDITIONAL CHANNEL DEPTH)

Section	Channel Width/Depth	Channel Length	Dredging Cu.Yd. (1)	Dredging Est.Cost
Channels				
Saginaw Bay	350X27'	72,336'	1,082,361	$7,576,527
River Entrance to Bay City	200X26'	2,481'	23,340	163,380
(GTW Bridge) to Saginaw	200X25'	24,763'	232,956	1,630,692
(6th St. Basin)	200X22'	68,376'	643,241	2,502,687
Turning Basins				
New (1000')	1000X28'	2,000'	78,074	546,518
Essexville	450X25'	1,954'	35,475	248,325
Airport	300X19'	1,000'	13,111	91,777
6th Street	650X22'	1,056'	27,534	192,738

Note: (1) Assumes two cu. yds. of side slope dredging per lineal foot of channel. Actual amount will vary.

TABLE II-3
ESTIMATED CHANNEL DEEPENING COSTS AND ANNUAL BENEFITS OF SAGINAW DEEPENING
(CUBIC YARDS AND DOLLARS IN THOUSANDS)

Commodity	Required Depth	Required Dredging	Cubic Yards	First Cost	Annual Benefits
Grain					
To Bay City	27'	2'	489.3	$ 3,428	$ 2,923
To Saginaw	27'	2-5'	3,843.1	26,902	2,923
Stone					
To Bay City	26'	1'	233.0	1,631	2,537
To Saginaw	26'	1-4'	2,916.1	20,412	2,537
Coal					
To Consumers	28'	1-3'	2,364.6	16,552	18,221

(1) Note: Does not include annual maintenance

Using a project life of 50 years with cost amortization at 8% and the average benefits discounted at 8% (in Corps analysis the full predicted stream of benefits is discounted) gives the following comparison of cost/benefits.

TABLE II-4
ESTIMATED ANNUALIZED COSTS/BENEFITS OF SAGINAW DEEPENING

Commodity	Cost(000)	Benefits(000)
Grain		
To Bay City	$ 280.9	$ 716.1
To Saginaw	2,206.0	716.1
Stone		
To Bay City	133.7	621.6
To Saginaw	1,673.8	621.6
Coal		
To Consumers	1,357.3	4,464.1

The abbreviated analysis has not attempted to merge the costs and benefits for all commodities (i.e. channel deepening for grain would automatically produce benefits for stone shippers). Also, it has applied the benefits to Saginaw or Bay City on an "either-or" basis. It does indicate the complexity of the full analysis.

Currently, the Corps of Engineers has a study underway, Great Lakes Connecting Channels and Harbors, that is examining incremental deepening of channels and harbors. This study could be used for the detailed cost-benefit analysis of Saginaw dredging.

Port Project Findings

Dredging of the Saginaw to facilitate commercial navigation has been going on since 1866. As a result, the river between the City of Saginaw and Saginaw Bay has been canalized. The earlier practice of sidecasting dredged material in the section of the river between Saginaw and Bay City, instead of placement of the material upland or in the Bay as at present, has closed off many marshy areas that would be attractive for recreational use of the river. On the other hand, the indicated natural depth of the river is less than 12 to 14 feet. Without continued maintenance dredging, the river would be useless for present day commercial navigation. The future enhancement of the river for both commercial and recreational user will require a broader local interest in and sponsorship of the Federal Port Project.

This study's findings in regard to the Federal Port Project are summarized under three general categories:

- Project Maintenance
- Project Improvement
- Project Sponsorship

Project Maintenance

Current routine maintenance dredging produces about 650,000 cubic yards of fill material annually - about 500,000 cubic yards from the Bay channel, up to 150,000

cubic yards from the river channel. For the forseeable future, disposal will be into containment areas.

(1) The remaining useful life of the spoil disposal area on Middle Ground now used for river dredging is about two years.

(2) The small Middle Ground facility has been feasible only because the adjacent Bay City sanitary landfill used most of the dredged fill material. Use of this landfill will be terminated in the near future, and it appears that any new disposal area will have to operate independently of the new sanitary landfill. This will require a significant increase in the size of the new river disposal area.

(3) The minimum land required for a new disposal area for river maintenance is estimated to be 335 acres. This would handle river maintenance to the year 2000 (18 years at 150,000 cubic yards or 2.7 million cubic yards), based on an average five feet of fill.

(4) For river disposal requirements to the year 2020, the same 335 acre facility could be used if ten feet of fill is environmentally and esthetically acceptable. Alternately, another site of similar size must be acquired. In any event, after 2020, another site of similar size must be acquired.

(5) Potential interim mid-river disposal sites are Skull Island, James Clements Airport and at Zilwaukee adjacent to the Farm Bureau elevator. Each site would hold about 200,000 cubic yards based on five feet of fill. Use of the airport is predicated on it going out of general aviation service - a possiblity that has produced heated debate. The areas adjacent to the Zilwaukee elevator are marshy, and filling may be environmentally unacceptable. Filling the Skull Island area would definitely be unacceptable.

(6) The best candidate site for the 335 acre river dredging disposal facility is the James Clement Seaplane Base, on the west bank of the river opposite Clements Airport and west of the Grand Trunk Western Railroad. This area is neither prime farmland or marshland.

(7) The remaining useful life of the "Saginaw Bay Diked Disposal Facility" (official Corps of Engineers name) is about ten years.

(8) The long-run most environmentally acceptable area for spoil disposal is Saginaw Bay. For the Bay channel and the Bay City portion of the river, it is also most economical.

(9) Until pollution in bottom sediments is eliminated by identification and elimination of point sources, Saginaw Bay dredged material disposal will require containment dikes.

(10) An additional diked disposal area will be needed in Saginaw Bay. A one-third expansion of the existing facility would be the most economical solution, and would handle disposal requirements to the year 2000. Alternately, if the assumption is that pollution will not be controlled by 2000, the preferred solution would be a separate 400 acre diked area south of the Bay Channel, northeast of the present facility.

(11) This report assumes that by 2020, bottom sediments will be clean enough for uncontained Bay disposal. Alternately, the cost benefit analysis of maintenance dredging costs may be negative.

(12) If and when uncontained Bay dumping is resumed, it is anticipated that spoils will be placed in the designated "Dumping Ground" west of the Bay channel and north of the present containment facility. Appropriate placement of uncontained spoils could be used to produce marshy areas which will be useful tradeoffs in "mitigating" marshy areas along the river used for more intensive development. Water circulation/sedimentation studies should be used to determine the appropriate location for both contained and uncontained Bay disposal areas.

Project Improvement

Deepening the river to Seaway depth (27') at Bay City would produce a one-time disposal requirement for about 500,000 cubic yards. Extending Seaway depth to Saginaw including the Sixth Street Turning Basin would produce an additional one-time disposal requirement for about 3.4 million cubic yards. The additional depth at Saginaw would also increase maintenance dredging there an undetermined amount because the larger channel cross section would reduce river velocity and increase sedimentation.

(1) Material dredged to provide Seaway depths at Bay City could be placed in the Saginaw Bay Diked Disposal Facility. This would shorten the life of the facility one year, but it is believed to be an acceptable amount.

(2) Material dredged to provide Seaway depths to Saginaw would require a new river disposal area of about 415 acres, based on an average five feet of fill, 200 plus acres if ten feet of fill were acceptable.

(3) The amount of dredged material from new work on the river exceeds the twenty-year requirements from maintenance dredging. It is not feasible to use the maintenance disposal area for new work. The two disposal requirements should be handled separately.

(4) The need for providing additional depths and a turning basin to serve 1000' lake vessels is not anticipated before 2020. At that time, it is anticipated that uncontained Bay disposal will be permitted, and that will be the solution for both new work and maintenance requirements.

(5) Preliminary cost-benefit analysis indicates a favorable ratio for providing Seaway depths to Bay City, an unfavorable ratio for providing Seaway depths to Saginaw. Due to the complexity of incremental analysis, this report is not the appropriate vehicle for a definitive determination of feasibility. It does indicate further analysis is justified.

(6) A Corps of Engineers study now underway of the Great Lakes Connecting Channels and Harbors would be an appropriate vehicle for official study of the feasibility of improving the Saginaw. A timely local request should be forwarded to the Corps. This study should suffice as evidence to justify official study.

(7) Alternately, if the Great Lakes Connecting Channels and Harbors study is not used to investigate feasibility of Saginaw improvements, it will be necessary to start at the beginning of the Congressional investigation/authorization/appropriation process. In any event, the process is a lengthy one, and five to twenty years may be required to produce improvements, depending on how much local initiative is exercised.

(8) The preliminary cost-benefit analysis was predicated on grain handling and other facilities being available at Bay City. The official cost-benefit analysis will consider only actual facilities (i.e., grain elevators at Saginaw), absent some evidence that facilities will be provided as necessary. In brief, local initiative includes facility requirements and assurances that channel improvements will be used.

(9) Further investigation is also required to address the issue of whether local interests will commit the resources necessary to provide required spoil disposal areas for river dredging - for the remaining life of the present project, or for the estimated 50-year life of improvements, or preferably in perpetuity.

(10) Shortening of the Saginaw Project to serve Bay City only is not an alternative suggested in this study. It will be the subject of official study eventually, absent evidence of local cooperation for spoil area and other costs.

Project Sponsorship

Local sponsorship of the Saginaw Project has been limited to contractual obligations to provide spoil disposal areas: Bay City provided the Middle Ground area, Bay County provided the Saginaw Bay area. A brief document search did not produce any evidence of right-of-way or easements provided by other political jurisdictions on the Federal Channel.

(1) The Federal Project needs a single, multi-county, port organization to provide project advocacy and initiative, and liaison between the Federal and local interests.

(2) The obligations of Bay City will be effectively extinguished when the Middle Ground disposal facility is filled in the forseeable future. With the possible exception of the Clements Airport, Bay City has no suitable disposal areas.

(3) The Clements Seaplane Base is within Bay County, but a spoil disposal facility there will impinge upon Saginaw County. In any event, Saginaw County is the principal beneficiary of river dredging, not Bay County.

(4) With over a dozen municipalities fronting the Federal Channel, a county-level organization is needed to facilitate coordination.

(5) Beyond spoil disposal, effective project sponsorship requires early identification of users' needs, and initiative in development of landside facilities and infrastructure to assure use of the project. Midland County is an integral part of the port hinterland and includes key port users. Along with Bay and Saginaw counties, Midland County should be a project sponsor/port organization sponsor.

(6) The port organization should be organized promptly. It is needed now to address problems and assure the orderly development of the river.

III. PORT FACILITIES INVENTORY

The basic methodology used in identifying future port needs, is to compare existing capacity of commercial and recreational facilities with the present and future demand for these facilities. The determination of commercial and recreational demands is addressed in separate subsequent chapters. Those two analyses have a common starting point in an inventory of waterfront facilities, used to determine capacity and identify land uses.

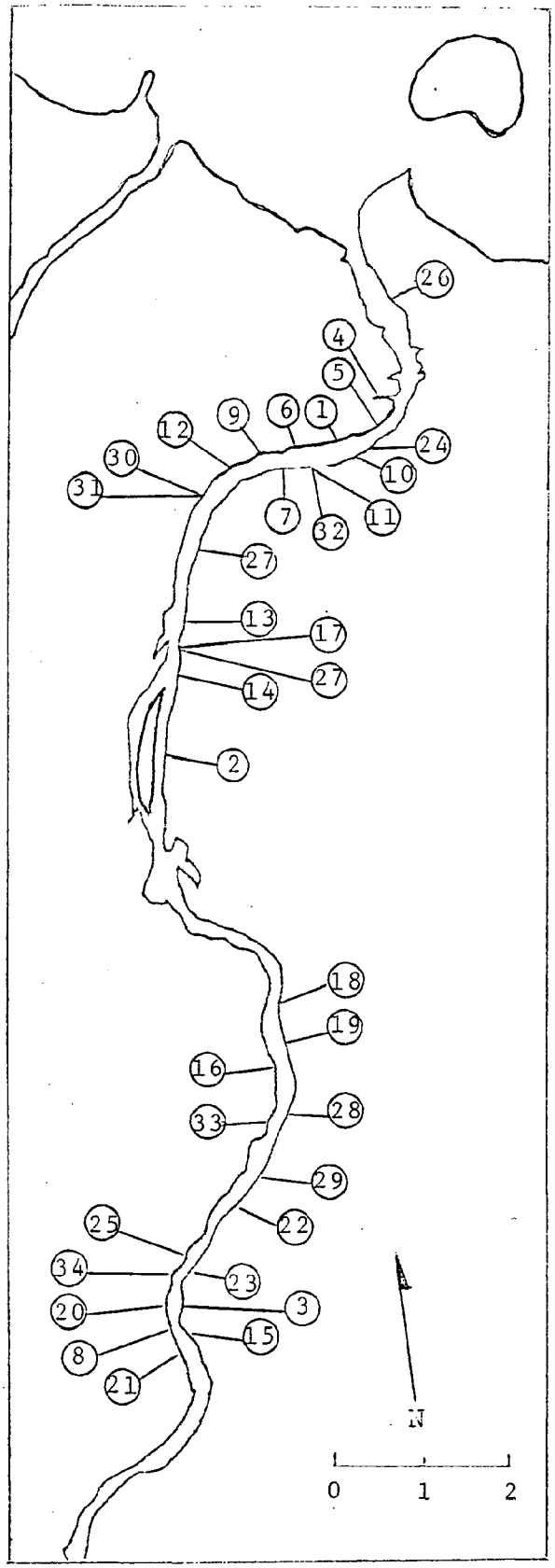
The inventory of commercial facilities is based on data in the Corps of Engineers publication, The Port of Detroit and Ports on the Saginaw River, Michigan (Port Series No. 45, Revised 1972), updated and expanded by a physical inventory of the riverfront, and supplemented with information from an ongoing Michigan Department of Transportation survey of port facilities.

The inventory of recreational facilities is based principally on physical inspection of the study area, on site and by air and vessel, supplementing aerial surveys by the Michigan Department of Natural Resources. Land use inventory is based on the Saginaw River Port Inventory prepared by the East Central Michigan Planning and Development Region in 1978 and verified during the recreational facility inventory.

The inventory identified 34 commercial facilities and 15 significant recreational facilities or resources. These facilities are listed and their locations identified on Figure III-1 and III-2 respectively, that follow immediately. Complete descriptions of these facilities including ownership, use and physical characteristics, are shown in the study's Appendix.

FIGURE III-1

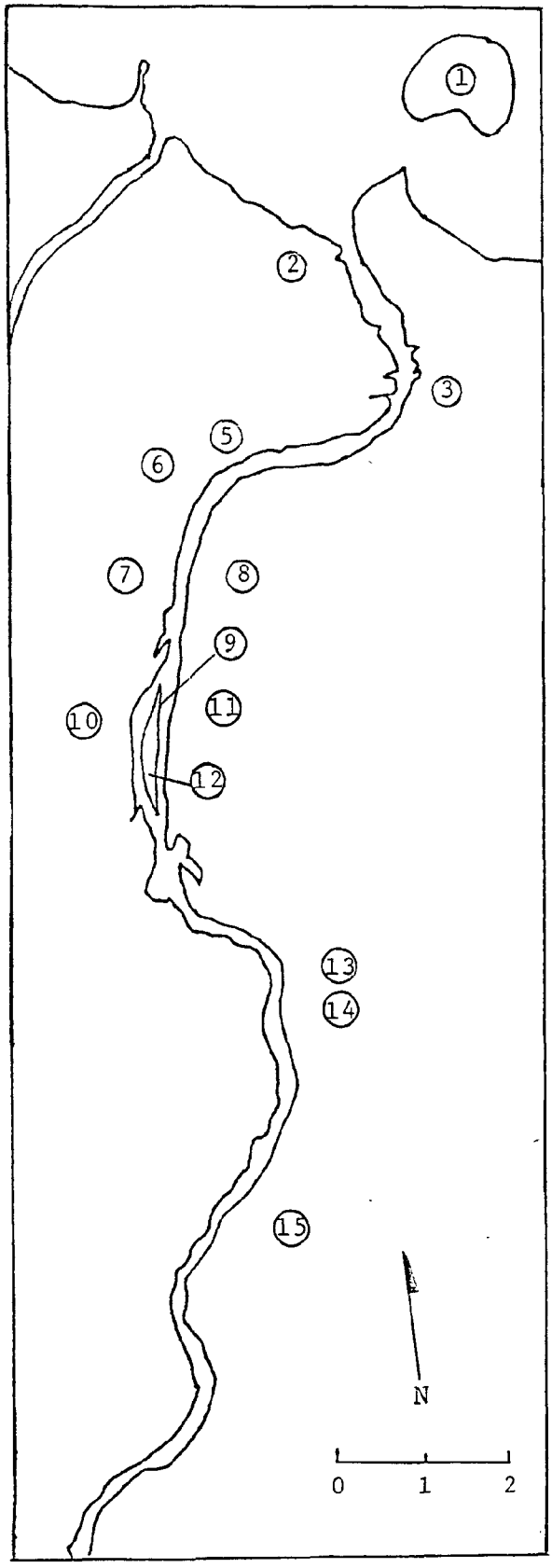
SAGINAW COMMERCIAL FACILITIES



1. Dow Seaway/Bay Refining/ Bangor
2. Saginaw Valley/Bay City
3. Oglebay/Surath/Carrollton
4. Union Oil/Bangor
5. Amoco Oil/Bangor
6. Total/Leonard/Bangor
7. Enterprise Oil/Essexville
8. Peerless Refining/Carrollton
9. International Terminals/ Bangor
10. Carrollton Stone/Essexville
11. Sand & Stone/Essexville
12. J. Wirt/Bay City
13. R. Gage/Bay City
14. Rock Products/Bay City
15. Midland Stone/Bay City
16. Andersen/Zilwaukee
17. Consumers/Zilwaukee
18. Saginaw Asphalt/Buena Vista
19. Wirt Saginaw/Buena Vista
20. Saginaw Asphalt/Carrollton
21. Saginaw Sand/Carrollton
22. R. Gage/Saginaw
23. Rock Products/Saginaw
24. Aetna/Essexville
25. Huron/Carrollton
26. Consumers Power/Hampton
27. Am. Horst/Brown Horst/Bay City
28. Chevrolet Nodular Iron/Saginaw
29. Chevrolet Grey Iron/Saginaw
30. Fletcher (Molasses)/Bay City
31. Fletcher (Fertilizer)/Bay City
32. Wirt Terminal/Essexville
33. Farm Bureau/Zilwaukee
34. Wickes/Carrollton

FIGURE III-2

SAGINAW RECREATIONAL FACILITIES



1. Saginaw Bay Diked Disposal Facility/Bay County/Public
2. Bay City Yacht Club/Commercial Marina/Bangor Township/Private
3. Saginaw Bay Yacht Club/Bangor Township/Private
4. Bay Harbor Marina/Bangor Township/Private
5. Dow Field/Bay City
6. Defoe Park/Bay County/Public
7. Veteran's Memorial Park/ Bay City/Public
8. Wenonah Park/Bay City/Public
9. Boys Club/Bay County/Private
10. Coryell Park/Bay County/ Private
11. Brennan Marina/Bay City/ Private
12. Sand's Marina/Bay City/ Private
13. Block's Marina/Bay County/ Private
14. Veteran's Memorial Park/ Bay County and Saginaw County/ Public
15. Crow Island State Game Area/ Saginaw County/State owned

IV. COMMERCIAL DEVELOPMENT

Overview

The volume of foreign commerce handled by all U.S. ports combined--the U.S. Port System--has grown at an annual rate of 6.8% over the past 30 years and 7.0% in the 1968-77 period. On the basis of value, because of inflation, waterborne commerce grew even faster. By almost any definition, port activities are a "growth industry", expanding at a rate greater than the economy overall. This fact has attracted the attention of federal, state and local development agencies. Not all ports have participated in this growth, as we know. Hence, this Saginaw River ports study.

Some degree of change in the composition and volume of waterborne commerce is inherent at all ports. Typically there is a constant attrition of existing business, more than compensated for by new movements. The composition of the commodity flows through each port are largely determined by the economic activities in the inland area served by the port--its "hinterland." The extent of this hinterland, and the volume of commerce, are largely determined by the "cost effectiveness" of the port and the combination of waterborne and overland transportation it offers.

Cost effectiveness is especially important because the U.S. has a "competitive port system." Many countries have a policy of encouraging the use of transportation modes or "load center" ports that are perceived to be in the national interest. To an extent that may be unique worldwide, the U.S. offers shippers a free choice of routings by transportation modes--or combinations of modes--and alternate ports. Our legislative history and regulatory policy has been to preserve competition--to the extent

of unrestricted use of routings via adjoining countries regardless of reciprocity. The result is that U.S. shippers in general, and exporters and importers in the Great Lakes region in particular, have a wide choice of routings to optimize cost and service factors. Specifically, the Midwest is centrally located for the domestic market, as well as ports on three tidewater coasts, plus having direct Lakes service. This helps make Midwestern producers more competitive in world markets. It also makes Great Lakes port business extremely competive.

As indicated, cost (rates), and service (frequency, speed or specialized carriers), are the two principal components of "cost effectiveness" for most shippers. The weighting attached to those components will vary with the commodity shipped--cost is critical for low-valued commodities, service is critical for high-value manufactures. Accordingly, there is no one hinterland for the Saginaw River, but a series of hinterlands reflecting the nature of the commerce and the existence of transportation alternatives including competing ports. The future commerce on the Saginaw will depend on how those hinterlands are shaped by competitive forces, as well as developments within those hinterlands.

The objective of the analysis in this chapter is to determine the adequacy of marine terminals on the Saginaw for present and potential waterborne commerce. The general approach will be to identify the total universe of potential commerce now, in 1980, and the future, year 2000, and analyze the competitive factors and facility or channel constraints that are significant impediments to the Saginaw achieving its full potential. The intent of this approach is to identify facility needs, not in isolation, but as part of an overall port development effort. Because of the dynamic nature of

port business, there is always an interaction between facility needs, facility supply, and port promotion.

Methodology

The basic effort in most port studies is to match facility demand against facility supply to identify facility needs. The basic effort in this section will be determination of demand. Facility supply has been determined in general terms by way of the port facility inventory, and will be analyzed further in this section. The identified needs are presented in this section's findings. Those findings are organized according to the facility categories commonly used in the port industry. These categories reflect both the facility ownership and facility operation that is typical at most ports.

- General Cargo. At some point in the past, just about all waterborne commerce was "general cargo". It was shipped in individual packages of a convenient size for handling "by hand." Literally, oil was shipped by the barrel. Technology has reduced general cargo to less than 15% of all waterborne commerce worldwide, although in terms of tons, it continues to grow. Containerization, another technological innovation that "unitizes" general cargo into 10 to 20-ton packages the size of a truck body (typically 8' x 8' x 20' or 8' x 8' x 40'), has captured most of the present general cargo business--perhaps 50% worldwide, but over 75% at general cargo ports such as New York.

  General cargo may be more significant to the Saginaw in terms of the past and future, rather than the present. In the past it supported three of existing, now underutilized terminals: Saginaw Valley Marine Terminal, and Bay City Seaway Terminal at Bay City, and the Oglebay-Norton Terminal at Saginaw. Prior to containerization, Dow chemicals and Michigan beans made Bay City an important port of call for international shipping. The current significance of general cargo is that this is the one area where public ownership of port facilities predominates at U.S. ports. In part, this is because general cargo typically involves multiple-user facilities--numerous

shippers and steamship lines--unlike bulk facilities.

- Bulk Cargo. In contrast to general cargo, where individual packages can be identified and counted, bulk shipments involve commodities--usually moving in large volumes--that are counted by weight or cubic measure: tons, barrels, gallons, cubic yards or bushels. Typically they are transferred to or from the vessel by pipeline (or hose) or conveyor belt. These are the commodities that dominate the commerce of the Great Lakes, which is over 95% iron ore, coal, grain, stone, and to a far lesser extent than elsewhere in the U.S., oil and petroleum products.

  Bulk cargo facilities involve an array of sophistication from ore terminals and grain elevators to stone "docks", which in some cases may be simply the natural river bank with some piling for the vessel to tie up to. The distinguishing characteristic is that typically they are proprietary, non-public, facilities that are an integral part of an industrial or commercial operation--such as those serving the cement or "ready mix" companies, or oil company tank farms. For the purpose of this study, "bulk cargo facilities" are defined as those where ownership logically is private.

- Neobulk Cargo. As indicated by the name, "neobulks" are essentially a hybrid. This applies to the nature of the commerce as well as the facility ownership and operation. The term "neobulk" was coined relatively recently to describe shipments of what used to be general cargo, in quantities and on specialized ships similar to bulks. Examples are forest products, coils of steel, automobiles, animal feeds and pellets. In many respects, containerization has converted general cargo to a neobulk operation.

  Similar to bulk cargo facilities, neobulk facilities span an array in sophistication. They can be quite specialized in purpose, but much more often than is the case with bulks, they are multiple-use, multiple-user facilities. They are seldom an integral part of an industrial process, and they may be publicly or privately owned. For the purpose of this study, "neobulk" is a convenient category to address those facilities for bulk cargos that are candidates for either public or private ownership and operation.

- Specialized Facilities. All studies need a "catch-all" category for what is left. In many studies this is mostly small craft, both recreational and fishing. In this study, "small craft" facilities are analyzed in a separate section. In some studies, "specialized" includes facilities that are proprietary in nature but publicly financed, such as waterfront cold storage warehouses, container depots, ferry terminals and/or shipyards. The neobulk category as defined earlier includes most of the Saginaw candidates for the "specialized" category.

The foregoing defines the goals of this section. The study methodology involves five interrelated steps that are the bases for the commodity analyses and forecasts used to determine facility demand. These steps are:

- Port Statistics
- Hinterland Analysis
- Economic Analysis
- Technology Analysis
- Rate Analysis

There are alternative methods for forecasting port commodity flows. Basically they involve either (1) extrapolation of historic trends at the port, (2) application of available forecast series for trade or economic sectors, or (3) analysis of the major port commodities and the related industries. Because of the dramatic changes in certain commodity movements on the Saginaw that reflect technological and competitive impacts, such as coal diverted to unit trains, the first two alternatives are inappropriate. The detailed analysis as outlined is necessary.

- Port Statistics. The past may or may not be prologue, but it does give perspective. To this end, the historical series for the Saginaw must be viewed in relation to Great Lakes results and trends for the entire U.S. Commodity trends on the Saginaw provide the starting point for detailed analysis.

- Hinterland Analysis. Previous port studies have determined generalized hinterlands for the Saginaw. 1/ As indicated earlier, there are actually a number of hinterlands for the port depending on the commodity and cost and service factors. In order to assist in hinterland definition, the external origins and destinations of the commodities moving through the port were determined for 1977. In the case of overseas general cargo, this identified specific shippers and quantities. The port facility inventory earlier identified terminal operators and many of the shippers in the domestic and Canadian trades.

  The cargo flows were determined from various sources, and are summarized in a series of tables in the text of this section. This data and the industrial directories for Bay, Saginaw and Midland Counties and the State of Michigan were used to produce:

  (1) working definitions of the Saginaw hinterlands for specific commodity categories, used for economic and commodity analyses and forecasts.

  (2) a calling list of selected key shippers for interviews to determine their present and future shipping requirements, and perception of the port's adequacy.

  Over 100 contacts were made in the interview process including government officials as well as shippers and repeat calls. The results of contacts with shippers and potential shippers are summarized in the text. In general these interviews were intended to do the following:

  (1) verify type and quantity of present shipments via the port.

  (2) determine what, if any, channel or facility constraints impact present shipments.

  (3) determine total potential waterborne commerce now and in the future, regardless of present routings or constraints.

1/ O'Donnell, MSU, 1958. Saginaw River Service Area, Economic Development Study, 1970. Novey, D. F., Sarkar, S. and Hales, P. R., Saginaw Valley State College, 1975.

(4) determine competitive factors--alternate modes and rates--that reduce potential to actual.

As expected, most shippers were reluctant to give present shipment volumes and forecasts, if any, because this information is considered proprietary. Where applicable, they were specific about the impact of channel constraints, or the rationale for using alternate routings. They gave only generalized information on the cost comparison for alternate routings because this information is also considered proprietary.

- Economic Analysis. The shipper interviews were very valuable in identifying possibilities for and constraints to growth of waterborne commerce on the Saginaw. By their nature, however, they do not provide a comprehensive, integrated base for independent forecasts of potential commerce as required by the study. Estimates of the total potential port commerce now, 1980, and future, year 2000, were produced from analysis of four generalized economic sectors:

    - Industry
    - Agriculture
    - Construction
    - Energy

  The economic sectors used in the study do not always correlate with the statistical series or forecasts of other studies. As used in this study, they consolidate certain sub-categories or sectors. This has been done to better identify the supply-demand factors relevant to waterborne commerce on the Saginaw. As appropriate, the constraints to full realization of the potential port commerce are identified in this analysis. These constraints--competitive and technical factors--are quantified further in the subsequent analyses, and integrated into the forecasts.

- Technology Analysis. Coal statistics for the Saginaw are evidence of the impact of technological change. The railroads have embraced the unit train concept because it by-passes switchyards, and produces a significant improvement in efficiency. This is reflected in unit-train rates. Less evident is the potential port commerce that is moving by other unit trains--chemicals to and from Texas, grain to Baltimore. Also, the inefficiencies in vessel operations due to channel depth constraints.

Vessel Technology. The analysis identifies the present, 1980, and forecasted, year 2000, fleets serving the Great Lakes inter and intralake and transoceanic services. This provides a measure of channel needs or constraints that are quantified in terms of rates in a subsequent analysis. These fleet forecasts address:

(1) size constraints of the system, locks and connecting channels, and anticipated changes. (studies)

(2) vessel trends for interlake dry-bulk carriers.

(3) vessel trends for interlake tankers and barges.

(4) vessel trends for direct transoceanic services.

(5) vessel trends for international container "feeder" services.

(6) special vessel types--shallow draft tug barges, ice-strengthened vessels.

Cargo Handling Technology. This analysis briefly examines the facility requirements relevant to:

(1) containerization of general cargo.

(2) bulk grain and feeds.

Season Extension. This analysis examines one technological change that may be beneficial to commerce on the Saginaw. Based on earlier research by TERA, it provides estimates of increased commerce for major commodity categories.

Rate Analysis. Truck transportation cost algorithims were used to produce the working definitions of the Saginaw hinterlands. Detailed rate or cost analysis has been confined to three specific areas for the reasons notes:

Vessel Rates--related to size of vessel for both Lakes and ocean services, in order to quantify the costs of Saginaw channel constraints.

Rail Rates--for water competitive coal movements, in order to verify the cost effectiveness of present unit train deliveries, and estimate cost comparisons for two scenarios:

(1) Appalachian coal via Toledo as a backhaul for carriers of western coal.

(2) Western coal as a substitute for Applachian, based on cost or air quality considerations.

Intermodal Rates--for containerized exports and imports by generalized origins, destinations and commodities, in order to evaluate cost and service factors related to general cargo prospects.

- Commodity Forecasts. The preceeding efforts are integrated to produce forecasts for the following commodity groups:

General Cargo

Chemicals

Metals & Scrap

Grain
Feeds
Fertilizers

Limestone
Sand
Cement/
Cement Clinkers

Coal
Crude Oil
Petroleum Products
Residual Oil

Port Statistics

Table IV-1 shows the long-run historical trend of cargo movements for Saginaw ports. The peak traffic movement was in 1966, over 7 million tons. The current level of traffic, approximately 3 million tons, was first exceeded in 1948.

TABLE IV-1
HISTORICAL TREND,
TOTAL CARGO MOVEMENTS, SAGINAW PORTS
(in Short Tons)

Year	Tons	Year	Tons
1978	3,173,573	1961	5,683,261
1977	3,656,238	1960	5,575,660
1976	3,072,473	1959	5,291,346
1975	2,705,330	1958	4,309,886
1974	4,180,075	1957	4,810,845
1973	4,095,978	1956	4,607,686
1972	4,386,273	1955	4,510,663
1971	4,847,133	1954	3,609,397
1970	4,616,434	1953	3,953,397
1969	5,098,710	1952	3,924,084
1968	5,228,842	1951	3,790,914
1967	6,562,483	1950	4,213,650
1966	7,243,288	1949	3,248,610
1965	7,003,601	1948	3,560,273
1964	5,874,886	1947	3,072,321
1963	5,317,827	1946	2,515,181
1962	5,041,897	1945	2,317,679
		1944	2,227,974

SOURCE: U.S. Army Corps of Engineers Waterborne Commerce of the United States, annual.

For perspective, Table IV-2 shows cargo movements at Saginaw ports compared with cargo movements at all Great Lakes ports, all U.S. tidewater ports, and all U.S. ports combined.

TABLE IV-2
COMPARATIVE PORT TRAFFIC
SAGINAW PORTS/GREAT LAKES/OTHER U.S. PORTS
1968-1978
(In Thousands of Short Tons)

PORTS/ TYPE TRAFFIC	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Saginaw											
To U.S. Lake Ports	167	195	111	122	125	77	87	32	104	79	
From " "	4,588	4,355	4,178	4,327	3,800	3,456	3,699	2,299	2,531	3,107	(1)
Total "Domestic"	4,755	4,549	4,289	4,449	3,925	3,533	3,787	2,330	2,635	3,187	
To Canadian Ports	192	121	73	107	144	233	214	252	188	200	
From " "	191	181	143	169	221	189	71	62	215	247	
Total "Canadian"	383	302	216	276	365	422	285	314	403	447	
To Overseas Ports	86	165	107	105	92	99	54	44	31	21	
From " "	5	82	4	17	4	42	55	17	3	1	
Total "Foreign"	91	247	111	122	96	141	109	61	34	22	
Total Saginaw	5,229	5,099	4,616	4,847	4,386	4,096	4,181	2,705	3,072	3,656	3,174
Great Lakes											
Between U.S. Ports ("Domestic")	151,116	160,844	157,059	140,955	145,013	156,621	146,067	129,331	132,113	109,080	142,663
U.S. to Canada	24,444	25,236	29,147	24,757	25,353	28,436	23,343	28,707	28,051	27,742	30,961
Canada to U.S.	25,659	19,770	21,820	19,105	18,861	22,989	19,027	18,122	25,846	25,416	19,917
Total "Canadian"	50,103	45,006	50,967	43,862	44,214	51,415	42,370	46,829	53,896	53,158	50,878
To Overseas Ports	5,990	6,839	6,785	8,724	9,632	10,063	4,776	6,720	6,962	8,594	12,593
From " "	6,450	4,875	4,586	6,864	6,287	5,271	4,316	3,333	4,799	7,412	7,129
Total "Foreign"	12,440	11,714	11,371	15,588	15,919	15,334	9,092	10,053	11,761	16,006	19,722
Total Great Lakes	213,659	217,564	219,397	200,405	205,146	223,380	197,529	186,213	197,770	178,244	213,263
Other U.S. Ports (Coastal)											
Interport, Tidewater	214,251	216,708	238,440	242,916	242,660	236,795	233,358	231,932	236,279	248,083	305,343
Intraport, Tidewater	92,348	88,903	83,105	83,510	92,149	97,506	92,252	81,131	86,679	87,099	92,778
Interport, River	430,174	460,945	472,123	479,218	506,989	503,237	511,022	503,932	523,973	528,705	534,509
Total "Domestic"	736,773	766,556	793,668	805,644	841,798	837,538	836,632	816,995	846,931	863,887	932,630
To Overseas Ports	166,580	168,944	205,698	172,759	197,430	238,808	238,687	236,708	250,633	240,784	259,317
From " "	278,827	295,648	312,934	333,777	372,418	461,828	473,940	455,117	539,674	625,309	616,141
Total "Foreign"	445,407	464,592	518,632	506,536	569,848	700,636	712,627	691,825	790,307	866,093	875,458
All U.S. Ports, Domestic(2)	887,889	927,399	950,727	946,598	986,812	994,158	982,700	946,327	979,043	972,967	1,075,292
All U.S. Ports, Foreign (3)	507,950	521,312	580,969	565,986	629,981	767,394	764,089	748,707	855,964	935,257	946,058
Total A.. U.S. Ports	1,395,839	1,448,712	1,531,697	1,512,584	1,616,793	1,761,552	1,746,789	1,695,034	1,835,007	1,908,224	2,021,350

Notes: (1) Preliminary 1978 figures, Saginaw incomplete
(2) Includes Great Lakes "Domestic"
(3) Includes Great Lakes "Canadian" and "Foreign"

Source: TERA, from Waterborne Commerce of the United States, U.S. Army Corps of Engineers, various editions.

As indicated in the preceding table, there is considerable year-to-year variation in port commerce at all ports at the local, regional and national level -- regardless of whether there is a discernable long-term growth or declining trend. Overall, domestic traffic has grown at the slowest rate, with "Interlake" -- which is the principal constituent of Saginaw's traffic -- actually showing a decline. Foreign trade, particularly at tidewater ports, shows the highest growth rate. However, this reflects increasing oil imports and to a lesser extent, grain exports. In brief, it is necessary to look beyond the tonnage totals, and examine specific commodity movements, to appreciate the factors affecting cargo trends.

Table IV-3 shows the trend of traffic at Saginaw ports by the principal commodity categories. Notably:

- Shipments of bulk grains have been relatively constant throughout the period.
- Receipts of construction materials -- limestone and cement -- have grown modestly.
- Coal receipts, which grew with utility plant expansion, dropped precipitously because of the change to all rail delivery.
- General cargo in and out has declined. This, like the coal decline, is attributable to a shift in routings rather than a decline in traffic moving into and out of the Saginaw ports' hinterland.

The future prospects for movement of their key commodity groups via the Saginaw ports will be analyzed in detail.

TABLE IV-3
COMMODITY TRENDS
SAGINAW PORTS TRAFFIC, 1968-1977
(in Short Tons)

COMMODITY		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
GENERAL	in	11,360	23,751	11,221	11,807	26,007	14,295	26,622	21,214	2,645	1,407
CARGO	out	32,308	53,425	31,985	29,071	10,533	23,725	17,170	21,345	10,777	1,873
	total	43,668	77,176	43,206	40,878	36,540	38,021	43,792	42,559	13,422	3,280
CHEMICALS	in	58,213	91,230	57,205	128,390	147,291	139,735	98,006	48,077	50,748	71,315
	out	41,302	38,859	43,645	64,549	71,627	63,600	43,807	22,730	23,789	12,616
	total	99,515	130,089	100,850	192,939	218,918	203,335	141,813	70,807	74,537	83,931
BENZENE	in	87,659	64,830	51,489	48,676	31,671	37,699	47,472	52,737	64,893	65,877
AND	out	-	2,069	-	-	-	-	-	-	-	-
TOLUENE	total	87,659	66,899	51,489	48,576	31,671	37,699	47,472	52,737	64,893	65,877
METAL	in	104,821	142,062	130,092	84,369	127,864	115,137	112,714	11,976	2,050	-
AND	out	117,423	222,999	65,718	76,909	61,856	32,277	65	1	-	-
SCRAP	total	222,244	365,071	195,810	161,278	189,720	147,414	112,779	11,977	2,050	-
GRAINS	out	176,321	139,084	87,102	99,056	134,553	223,093	205,725	252,061	206,927	207,059
	total	176,321	139,084	87,102	99,056	134,553	223,093	205,725	252,061	206,927	207,059
FEEDS	out	4,069	-	4	-	-	-	-	-	-	-
	total	4,069	-	4	-	-	-	-	-	-	-
FERTIL-	in	-	12,028	-	-	6,040	-	10,075	20,399	17,281	46,418
IZERS	total	-	12,028	-	-	6,040	-	10,075	20,399	17,281	46,418
LIMESTONE	in	1,942,551	2,233,127	1,700,260	2,057,377	1,961,485	2,435,854	2,335,694	1,484,723	1,819,724	2,184,792
AND OTHER	out	125	738	9,157	112	68	8	20,120	-	-	-
MINERALS	total	1,942,676	2,233,865	1,709,417	2,057,489	1,961,553	2,435,862	2,355,814	1,484,723	1,819,724	2,184,792
SAND	in	-	-	9,191	20,039	42,997	31,441	48,604	8,605	-	-
	out	4,037	-	-	-	-	-	-	-	-	-
	local	347,627	401,544	308,448	476,217	478,113	510,807	486,579	409,052	491,462	495,976
	total	351,664	401,544	317,639	496,256	521,110	542,248	535,183	417,657	491,462	495,976
CEMENT	in	248,143	156,408	215,000	345,170	344,317	90,124	145,571	92,191	196,373	231,325
	total	248,143	156,408	215,000	345,170	344,317	90,124	145,571	92,191	196,373	231,325
COAL	in	1,653,181	1,179,722	1,566,838	1,087,254	646,936	77,410	364,219	62,193	-	58,382
	out	-	-	-	-	-	-	-	-	-	26,257
	total	1,653,181	1,179,722	1,566,838	1,087,254	646,936	77,401	364,219	62,193	-	84,637
CRUDE	in	-	-	-	-	7,355	4,947	15,981	13,225	-	-
PETROLEUM	out	-	-	-	-	-	-	-	-	13,124	-
	total	-	-	-	-	7,355	4,947	15,981	13,225	13,124	-
GASOLINE	in	166,390	181,056	172,004	165,513	129,310	114,101	48,818	96,851	73,431	57,274
	out	-	-	-	8,935	6,226	-	2,211	-	-	-
	total	166,390	181,056	172,004	174,448	135,527	114,101	61,029	96,851	73,431	57,274
DISTIL-	in	100,567	112,156	94,519	99,992	73,486	89,004	79,938	56,269	29,555	42,701
LATE FUEL	out	9,553	9,379	50,880	49,923	34,681	4,537	20,213	31,675	37,908	36,516
OIL	local	3,087	-	-	-	-	5,203	-	-	-	-
	total	113,207	121,535	145,399	137,958	108,167	98,744	100,151	87,944	67,463	79,217
OTHER	in	-	11,679	-	-	17,759	21,124	7,711	-	2,748	-
FUELS	out	60,465	22,550	11,646	5,706	26,105	61,850	32,739	4	29,038	16,450
	total	60,465	34,229	11,646	5,706	43,864	82,974	40,450	4	31,786	16,450
MISC.	in	-	13	21	25	-	-	19	2	-	-
	out	-	-	-	-	-	-	-	-	-	-
	local	-	1	9	-	2	15	-	2	-	-
	total	-	14	30	25	2	15	19	2	-	-
TOTAL PORT		5,228,842	5,098,710	4,616,434	4,847,133	4,386,273	4,095,978	4,180,073	2,705,330	3,072,473	3,656,238

Source: TERA, from U.S. Army Corps of Engineers Waterborne Commerce of the United States

Because of the seasonality of navigation on the Great Lakes and other traffic constraints, it is more appropriate to compare Saginaw ports with other Great Lakes ports. As shown in Table IV-2, Saginaw ports have about held their own in comparison with Great Lakes ports except for direct overseas imports and exports. The latter is largely explained by the composition of St. Lawrence Seaway traffic. Its growth is largely attributable to steel imports and grain exports. The trend of break bulk and particularly containerized general cargo has been down. Table IV-4 shows the trend of Seaway traffic by types of cargo.

TABLE IV-4
SEAWAY TRAFFIC TRENDS
(in Short Tons)

	1960	1970	1973	1974	1975	1976	1977	1978
General Cargo								
In	923,275	1,680,606	2,164,868	1,399,102	1,379,072	1,588,964	1,737,175	1,737,174
Out	1,698,628	2,317,964	1,924,074	1,390,203	1,334,241	1,405,176	1,329,098	1,112,436
Total	2,621,903	3,998,470	4,988,942	2,789,305	2,713,313	2,994,140	3,066,273	2,849,610
Neobulk (1)								
In	396,562	3,995,192	4,269,635	3,248,909	2,409,359	2,831,354	5,401,180	3,486,003
Out	556,411	921,935	458,546	531,810	303,930	713,326	299,811	367,238
Total	1,452,973	4,917,127	4,728,181	3,780,719	2,713,289	3,544,680	5,700,991	3,853,241
Grains								
In	27,605	29,260	52,490	12,979	31,073	31,008	41,878	11,331
Out	7,707,358	19,346,246	23,786,551	15,071,918	21,057,347	20,260,858	23,751,972	27,869,485
Total	7,734,963	19,375,506	23,739,041	15,688,463	21,088,420	20,291,866	23,793,850	27,880,816
Iron Ore								
In	4,315,432	14,809,650	15,691,569	14,291,462	14,490,427	20,535,312	22,226,978	13,520,285
Out	-0-	308,887	-0-	-0-	15,242	-0-	45,535	21,892
Total	4,315,432	15,118,537	15,691,569	14,291,462	14,505,669	20,535,312	22,272,513	13,542,177
Other Bulk								
In	2,618,747	4,698,446	5,394,717	4,053,240	3,630,944	3,831,214	5,606,652	6,189,245
Out	1,651,760	3,035,082	3,934,687	3,530,276	3,358,763	3,200,133	2,894,498	2,627,589
Total	4,270,507	7,733,528	9,329,404	7,583,516	6,989,712	7,031,347	8,501,150	8,816,834
Grand Total	20,310,346	51,143,168	57,634,137	44,146,444	48,010,404	54,397,345	63,334,777	56,942,678

Note: (1) Principally unworked iron and steel (steel mill products). Also includes forest products.

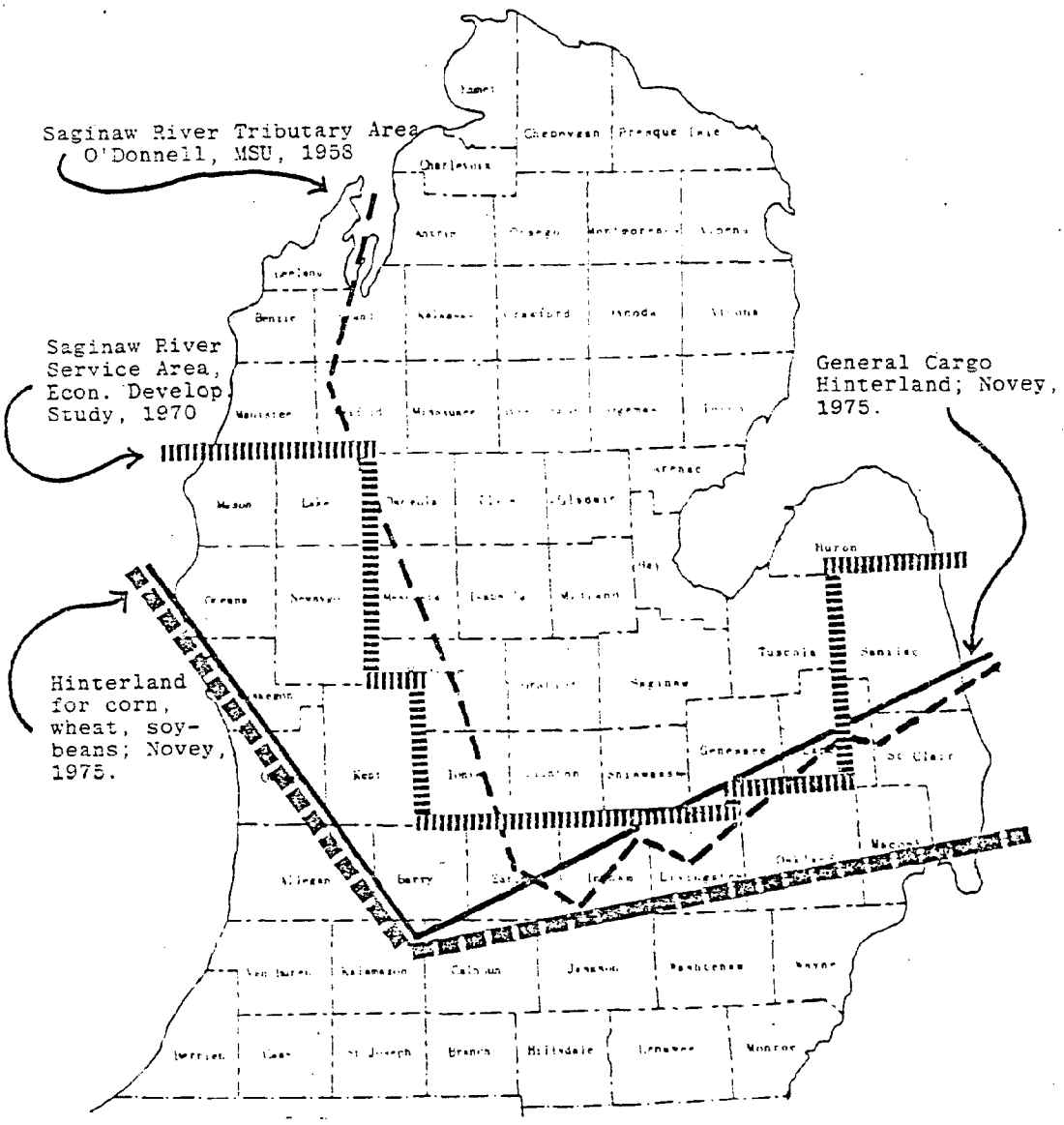
Source: St. Lawrence Seaway Development Corp., Traffic Reports, annual 1960-1978.

As information, all the above statistics are in short (2000#) tons. Trade statistics frequently are shown in terms of dollar value. At the ports, a variety of tons are involved -- metric and long tons, measurement and or revenue tons. Most ports, regardless of units used in their internal records, usually convert cargo movements to short tons because they are the units used by the Corps of Engineers, applicable to all U.S. ports. Another reason for using weight tons instead of value or volume measure is that there is a close correlation between port-related employment and the tonnage of various commodities handled. Inflation would distort the relationship of cargo value with number of jobs. On the other hand, given the number of jobs, inflation can then be applied to quantify the economic impact of the port.

Hinterland Analysis

The hinterland served by the Saginaw ports has been defined in previous port studies, in 1958, 1970 and 1975. These are shown on the following map from the 1978 port study.

FIGURE IV-1
SAGINAW RIVER PORT HINTERLANDS



Source: Saginaw River Port Study, from Bay City Areas Transportation Study. Bay County Planning Commission. May, 1978.

The previous definitions of the Saginaw ports' hinterland were based on the cost of overland transportation from the interior to alternate port gateways. This is an appropriate methodology, and there is general agreement on the south boundary of the hinterland. The hinterland definitions differ at their western and eastern extremities because:

(1) A contraction of vessel services has eliminated Michigan ports on Lake Michigan as effective alternate gateways for general cargo. When the Seaway opened in 1958, these vessels were expected to call at virtually all ports, as Lakes package freighters had done in the past. By 1970, it was evident that this would not be the case with smaller ports such as Traverse City and Ludington. By 1975, Chicago was the effective alternate gateway to the west—hence the progressive movement of the western boundary of the Saginaw hinterland in successive studies.

(2) The availability of suitable port facilities also determines the effectiveness of a port as an alternate gateway. In the absence of shiploading grain elevators at Detroit, Toledo is the closest alternate gateway for Saginaw area grains. With a facility for handling pelletized feeds, Port Huron is an alternate gateway for Saginaw area beet pulp pellets. Hence, the several eastern boundaries for the Saginaw hinterland, based on different levels of analysis. Since Chicago and Burns Harbor, Indiana, have grain-loading facilities, the western hinterland boundary is substantially the same for all types of cargos.

In brief, the Saginaw hinterland is defined by an interaction of cost (including vessel as well as overland carrier rates) and service factors. A single hinterland may be too generalized for detailed analysis, but neither is it feasible to define a hinterland for each commodity that is or could be moving via the Saginaw. This study uses four hinterlands that aggregate commodities according to their cost/service characteristics as follows:

(1) Overseas General—packaged cargo where vessel service considerations are critical.

(2) Overseas Bulks—bulk cargo such as grain where facility requirements are critical.

(3) Interlake Bulks—relatively high value commodities such as chemicals, fuels, to and from diverse domestic points.

(4) Intrastate Bulks—low valued bulks such as sand, stone, cement, moving relatively short distances.

Respectively, the hinterlands equate with the economic sectors of (1) manufacturing, (2) agriculture, (3) energy materials, (4) construction. Some of the assumptions used in defining these hinterlands are:

- The alternate gateways for general cargo are Chicago/Burns Harbor on the west, and Detroit on the east. These are equally applicable to direct vessel shipments or the inland terminals for overland "minibridge" services that connect with Tidewater ports, i.e., multi-container movements at Chicago and Canadian transshipments via Detroit. The hinterland boundaries are adjusted to reflect the differentially higher ocean rates to Lake Michigan versus Lake Erie.

- The alternate gateways for agricultural exports are Chicago/Burns Harbor on the west, and Toledo on the east. The vessels involved are all contracted for an individual trip (usually full load) basis. The rates, or charter hire, for oceangoing vessels are subject to fluctuation because of market conditions, and there is no consistent rate differentials based on the Lake loading port (other than water depth available and hence, size of load). The rates for Lake vessels operating through the Seaway to lower St. Lawrence transshipment points are more stable, and Chicago rates are on the order of 2¢ per bushel more than Toledo, a differential of under 10%. As a practical matter, the hinterland boundary has been assumed to be equidistant between Saginaw and the alternate gateways.

- With over a dozen commercial ports on Michigan's lower peninsula capable of handling Lake vessels, the hinterland's alternate ports are numerous. The hinterland for both "interlake" and "interstate" shipments is further constrained by the existence of alternate overland transportation modes—pipelines, truck and rail services. The final definition of these two

hinterlands was based on an interactive process, after identification of Great Lakes origins and destinations of cargos moving via the Saginaw, and interviews with shippers to identify the local market area or origin of the commodities.

The hinterlands used in this study are shown in Figure IV-2. Hinterlands are defined in terms of boundary counties—those marginally in the hinterland—because most data is on a county-by-county basis. These border counties include some key population centers such as Flint, Lansing and Battle Creek. Basically, the overseas cargo hinterlands coincide with those in the 1975 Novey study, and include 42 to 47 counties wholly within the hinterlands. The interlake and interstate hinterlands are significantly smaller, with 10 to 15 counties inside the boundary counties.

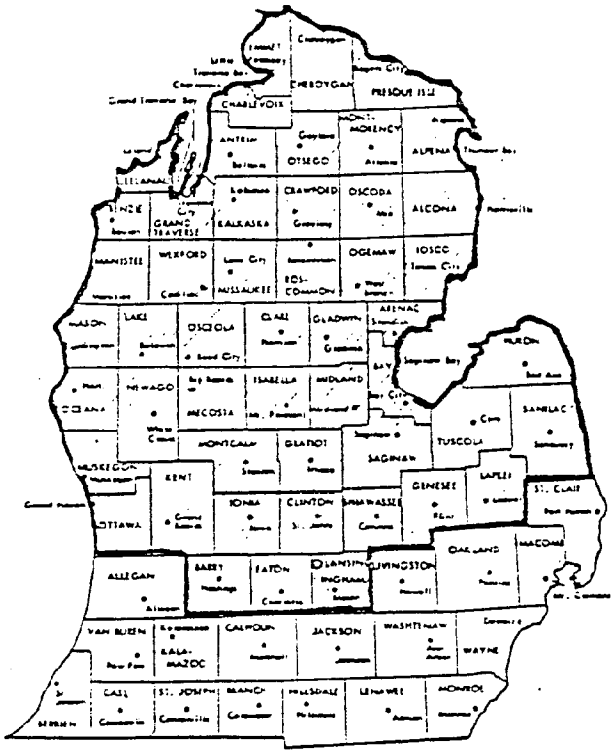
There is one important caveat relative to the Overseas General Cargo hinterland. The contraction of vessel services that eliminated Muskegon as an alternate port gateway, subsequently impacted Bay City. Until such services are reestablished, the hinterland defined for Saginaw ports is potential only, except for possible sporadic shipments of sufficient volume to "induce" a ship call.

This study includes an analysis of general cargo potential that could be considered disproportionate to the amount of traffic lost or to be regained. It is included because:

- Bay City was the penultimate surviving general cargo port in Michigan, and a thorough understanding of the reasons for this traffic's demise is appropriate.
- A perennial project of Great Lakes ports is the revival of general cargo services. Bay City appears to be the best centrally located Michigan port outside Detroit to participate in this revival. It is important to determine whether there is potential traffic to justify the revival.

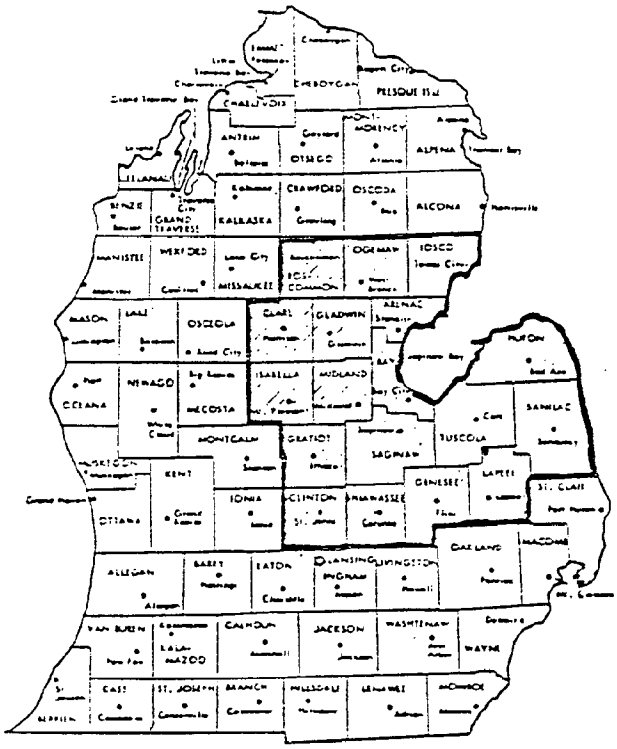
FIGURE IV-2

SAGINAW RIVER PORT HINTERLANDS

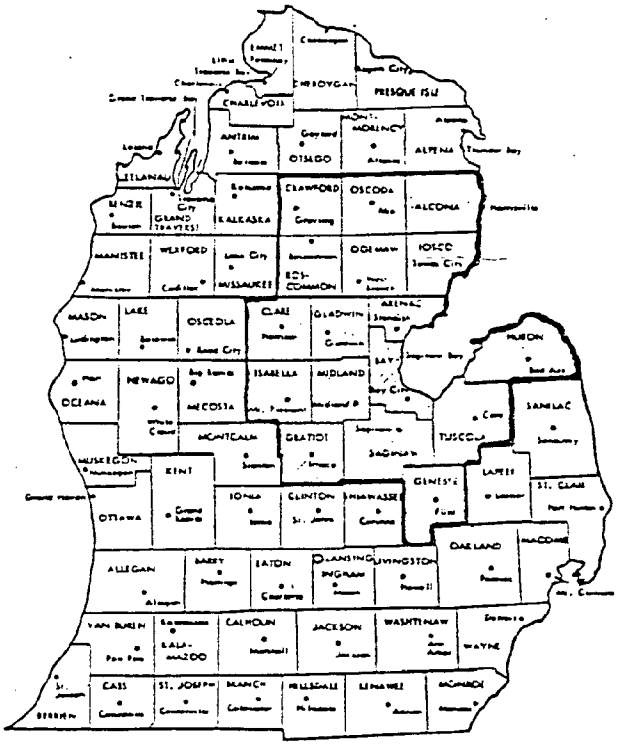


General Cargo

Agriculture



Construction



Energy Materials

Cargo Flows To and From the Saginaw Hinterland

Two sources were used to expand the historical port statistics in the preceeding section to identify actual and potential cargo origins and destinations for Saginaw ports:

- Overseas and hinterland origins and destinations for actual and potential 1977 Saginaw traffic.
- Lakeport origins and destinations for actual 1977 Saginaw traffic.

Overseas Cargo. Data on general cargo origins and destinations was obtained from a partially complete study, Great Lakes Cooperative Port Planning Study, being performed for the Maritime Administration and cooperating states by PRC Harris, Inc. The data covering trade via U.S. Tidewater ports is summarized in Tables IV-5, 6 and 7 that follow. Note: Only those counties in the hinterland with exports and/or imports (35) are shown in the tabulations.

By definition, the data from the 1980 Great Lakes Study excludes imports and exports via Great Lakes and Canadian ports. To estimate the total amount of hinterland general cargo exported and imported this study used an analysis of Michigan exports and imports in a 1979 TERA study, The Impacts of Minibridge Tariffs and Railroad Rate Equalization on the Competitive Positions of Ports. Table IV-8 and 9 summarize that study's findings.

TABLE IV-5
1977 SAGINAW HINTERLAND GENERAL
CARGO IMPORTS VIA U.S. TIDEWATER PORTS
(in Short Tons)

Overseas Origin / County	Europe	Mediterr./ N. Africa	S. Africa	S. America	Central Am. /Caribbean	Far East /Oceania	Middle East /India	Totals
Allegan								--
Alpena				1.60				1.60
Arenac								--
Barry						34.67		34.67
Bay	8.38	129.68						138.06
Calhoun	194.23					74.53		268.76
Charlevoix								--
Clinton								--
Eaton								--
Emmet		0.07						0.07
Genesee	231.04					132.48		363.52
Gladwin								--
Grand Traverse	21.83	17.00				7.83		46.66
Gratiot	0.82					3.87		4.69
Huron								--
Ingham	139.22	11.00		0.02		111.26		261.50
Ionia		3.65					1.32	4.97
Isabella						0.12		0.12
Kalamazoo	1,246.08	197.91		19.18	1.16	21.90	101.17	1,587.40
Kalkaska						14.39		14.39
Kent	794.14	110.22		3.67	2.12	319.46	0.29	1,229.90
Lapeer								--
Livingston	72.88					20.07		92.95
Mason						4.46		4.46
Midland	94.80			5.74				100.54
Missaukee								--
Montcalm						623.37	23.46	646.83
Muskegon	821.90	17.97		9.13		132.91	2.52	984.43
Newaygo	0.02	2.00						2.02
Ottawa		35.90				442.55		478.45
Saginaw	1.00	0.11		127.55	161.50	18.16		308.32
Sanilac	27.04							27.04
Shiawassee	1.79							1.79
Tuscola						12.39		12.39
Wexford						0.16		0.16
TOTALS	3,655.17	525.51	0.00	166.89	164.78	1,974.58	128.76	6,615.69

Source: TERA, from Great Lakes Cooperative Port Planning Study, 1980.

TABLE IV-6
1977 SAGINAW HINTERLAND GENERAL CARGO EXPORTS VIA U.S. TIDEWATER PORTS
(in Short Tons)

Destination O'seas / County	Europe	Mediterr./ N. Africa	S. Africa	S. America	Central Am. /Caribbean	Far East /Oceania	Middle East /India	Totals
Allegan	1.01							1.01
Alpena	9.30			5.00	9.34	22.64	489.44	535.72
Arenac	18.64							18.64
Barry	70.22	4.23	0.62	1.43		7.67	4.78	88.95
Bay	2.50		0.05				6.59	9.14
Calhoun	1,584.66	14.97	67.86	294.03	156.66	53.07	126.11	2,297.36
Charlevoix	1.15							1.15
Clinton	10.00							10.00
Eaton	8.98							8.98
Emmet								0.00
Genesee	990.16	314.56	26.80	318.28	79.84	62.69	10.44	1,802.77
Gladwin	13.25			436.02		12.40		461.67
Grand Traverse	5.47			1.69				7.16
Gratiot	90.30	7.93	67.25	28.96	56.60	283.46	62.76	597.26
Huron					41.20	7.37		48.57
Ingham	477.16			558.12	114.00			1,149.28
Ionia								0.00
Isabella						1.30		1.30
Kalamazoo	436.38	2.43	9.94	186.96	35.14	69.43		740.28
Kalkaska								0.00
Kent	583.66	168.20	34.96	257.30	120.40	148.16	74.76	1,387.44
Lapeer	2.87							2.87
Livingston	25.05					63.12		88.17
Mason								0.00
Midland	2,925.99	204.59	169.79		22.27	2,051.43	101.83	5,475.90
Missaukee	0.88							0.88
Montcalm	10.87	333.99		21.11	32.32	11.44	215.12	624.85
Muskegon	1,423.79	43.49	9.24	70.24	6.90	43.51	53.81	1,650.98
Newaygo	32.44		1,115.01	73.80	753.35	3.06	263.27	2,240.93
Ottawa	498.04	55.66	29.23	131.12	39.75	131.36	7.25	892.41
Saginaw	389.72	93.31	23.29	190.09	18.40	43.92	53.30	812.03
Sanilac							359.36	359.36
Shiawassee	37.54		7.92	164.16	11.30	39.07		259.99
Tuscola						10.74		10.74
Wexford	3.72						1.36	5.08
TOTALS	9,653.75	1,243.36	1,561.96	2,738.31	1,497.47	3,065.84	1,830.18	21,590.87

Source: TERA, from Great Lakes Cooperative Port Planning Study, 1980.

TABLE IV-7
1977 SAGINAW HINTERLAND GENERAL
CARGO IMPORTS AND EXPORTS VIA U.S. TIDEWATER PORTS
(in Short Tons)

County \ Overseas Area	Europe	Mediterr./ N. Africa	S. Africa	S. America	Central Am. /Caribbean	Far East /Oceania	Middle East /India	Totals
Allegan	1.01							1.01
Alpena	9.30			6.60	9.34	22.64	489.44	537.32
Arenac	18.64							18.64
Barry	70.22	4.23	0.62	1.43		42.34	4.78	123.62
Bay	10.88	129.68	0.05				6.59	147.20
Calhoun	1,778.89	14.97	67.86	294.03	156.66	127.60	126.11	2,272.09
Charlevoix	1.15							1.15
Clinton	10.00							10.00
Eaton	8.98							8.98
Emmet		0.07						0.07
Genesee	1,221.20	314.56	26.80	318.28	79.84	195.17	10.44	2,166.29
Gladwin	13.25			436.02		12.40		449.27
Grand Traverse	27.30	17.00		1.69		7.83		53.82
Gratiot	91.12	7.93	67.25	28.96	56.60	287.33	62.76	601.95
Huron					41.20	7.37		48.57
Ingham	616.38	11.00		558.14	114.00	111.26		1,410.78
Ionia		3.65					1.32	4.97
Isabella						1.42		1.42
Kalamazoo	1,682.46	200.34	9.94	206.14	36.30	91.33	101.17	2,327.68
Kalkaska						14.39		14.39
Kent	1,377.80	278.42	34.96	260.97	122.52	467.62	75.05	2,617.34
Lapeer	2.87							2.87
Livingston	97.93					83.19		181.12
Mason						4.46		4.46
Midland	3,023.79	204.59	169.79	5.74	22.27	2,051.43	101.83	5,579.44
Missaukee	0.88							0.88
Montcalm	10.87	333.99		21.11	32.32	634.81	238.53	1,271.63
Muskegon	2,245.69	61.46	9.24	79.37	6.90	176.42	56.33	2,635.41
Newaygo	32.46	2.00	1,115.01	73.80	753.35	3.06	263.27	2,242.95
Ottawa	498.04	91.56	29.23	131.12	39.75	573.91	7.25	1,370.86
Saginaw	390.72	93.42	23.29	317.64	179.90	62.08	53.30	1,120.35
Sanilac	27.04						359.36	386.40
Shiawassee	39.33		7.92	164.16	11.30	39.07		270.78
Tuscola						23.13		23.13
Wexford	3.72					0.16	1.36	5.24
TOTALS	13,308.92	1,768.87	1,561.96	2,905.20	1,662.25	5,040.42	1,958.94	28,506.56

Source: TERA, from Great Lakes Cooperative Port Planning Study, 1980.

TABLE IV-8
1976 MICHIGAN GENERAL CARGO IMPORTS
(IN THOUSANDS OF SHORT TONS)

Gateway Port(s)	Overseas Trade Routes							
	The Americas		Europe and Mediterranean		Far East and Mid East		Africa	
	Tons	%	Tons	%	Tons	%	Tons	%
North Atlantic	108.6	60.8	111.1	13.0	112.9	15.6	-	-
South Atlantic	27.5	15.4	-		2.0	0.3	-	-
Gulf	1.8	1.0	2.0	0.3	64.9	8.9	-	-
Pacific	2.5	1.4	-	-	79.0	10.9	-	-
U.S.Tidewater	140.4	78.6	113.1	13.3	259.3	35.7	-	-
Detroit	23.0	12.9	568.4	66.4	443.6	61.2	-	-
Chicago	-	-	2.2	0.3	-	-	-	-
Other Lakes	13.6	7.6	26.8	3.1	-	-	-	-
via Canada	1.5	0.8	146.0	17.0	22.0	3.0	0	-
Total	178.5	100.0	856.5	100.0	724.4	100.0	0	-

SOURCE: TERA

TABLE IV-9
1976 MICHIGAN GENERAL CARGO EXPORTS
(IN THOUSANDS OF SHORT TONS)

Gateway Port(s)	Overseas Trade Routes							
	The Americas		Europe and Mediterranean		Far East and Mid East		Africa	
	Tons	%	Tons	%	Tons	%	Tons	%
North Atlantic	101.9	64.8	135.8	61.7	157.8	81.6	11.2	88.0
South Atlantic	50.3	32.0	-	-	-	-	-	-
Gulf	-	-	-	-	4.7	2.4	-	-
Pacific	-	-	-	-	11.3	5.7	-	-
U.S.Tidewater	152.2	96.8	135.8	61.7	173.8	89.6	11.2	88.0
Detroit	4.4	2.8	18.8	8.7	13.4	6.8	-	-
Chicago	-	-	-	-	-	-	-	-
Other Lakes	-	-	22.8	10.5	-	-	-	-
via Canada	.5	0.4	42.0	19.1	6.5	3.6	1.5	12.0
Total	157.1	100.0	219.4	100.0	193.7	100.0	12.7	100.0

SOURCE: TERA

Reaggregating the Saginaw hinterland import and export totals shown in Tables 5 and 6 according to the trade routes shown in Tables 8 and 9 gives the following:

TABLE IV-10
SAGINAW GENERAL CARGO IMPORTS AND EXPORTS VIA
U.S. TIDEWATER PORTS - BY TRADE ROUTE
(IN SHORT TONS)

	The Americas	Europe and Med.	Far East, Mid East	Africa	Total
Imports	331.67	4,180.68	2,103.34	-0-	6,615.69
Exports	4,235.78	10,897.11	4,896.02	1,561.96	21,590.87
Total	4,567.45	15,077.79	6,999.36	1,561.96	28,206.56

Using the percentages shown in Tables 8 and 9 to expand the Saginaw general cargo to include Lakes-direct shipments and Canadian transshipment gives the following estimate of total hinterland general cargo.

TABLE IV-11
TOTAL 1977 SAGINAW HINTERLAND GENERAL CARGO
IMPORTS AND EXPORTS-BY TRADE ROUTE
(IN SHORT TONS)

	The Americas	Europe and Med.	Far East, Mid East	Africa	Total
Imports	423.75	31,433.68	5,891.71	-0-	37,749.14
Exports	4,375.81	17,659.82	5,464.31	1,774.95	29,274.89
Total	4,799.56	49,093.50	11,356.02	1,774.95	67,024.03

Total 1977 direct overseas imports and exports of general cargo via the Saginaw were 1210 tons of textile materials and 4,169 tons of chemicals and related materials, respectively. Other overseas trade consisted of bulk commodities, and were exports only: 6284 tons of oilseeds and 10,320 tons of chemicals shipped direct, and 200,775 tons of grain and oilseeds shipped by vessel to Canadian transshipment points on the lower St. Lawrence. An indication of the chemicals origins and destinations is shown in the Midland County figures in Tables 5 and 6. The Bureau of Census study, Domestic and International Transportation of U.S. Foreign Commerce: 1976, indicates that 94% of the transshipped grain moved transatlantic - 74% North Europe, 20% to the Mediterranean.

Lakes Cargo. Through a special computer run of the Corps of Engineers statistics, the Office of Domestic Shipping of the Maritime Administration provided the external origins and destinations of 1977 Saginaw ports' "Domestic" traffic. This analysis is shown in Table IV-12. Shipments to and from Canada, excluding export grain shipments via Canadian St. Lawrence ports, are also shown in the table to capture all of the 1977 Saginaw traffic in combination with the "Overseas Cargo" analysis.

Shipper Inverviews

The facilities inventory, port statistics and preceding hinterland analysis disclosed most of the shippers actually using the Saginaw. The major shippers and facility owners were interviewed to verify or determine the following:

(1) The type and quantity of present shipments via the port.

TABLE IV-12
1977 SAGINAW TRAFFIC TO/FROM LAKEPORTS
(in Short Tons)

Ports \ Commodities	Misc Gen'l Cargo	Fertilizers	Basic Chemicals	Benzene Toluene	Gasoline	Jet Fuel	Distillate Fuel	Residual Oil	Coal	Cement	Stone	Sand	Total
Intrastate													
To Alpena						34,307							34,307
From Alpena										81,271	677,773		759,044
From Escanaba											267,547		267,547
From Detour											77,616		77,616
To Detroit							2,209	13,737					15,946
To Muskegon								2,713					2,713
From Rogers City											1,023,463		1,023,463
From S. Ste. Marie											66,103		66,103
To Traverse City									26,257				26,257
From Saginaw Bay												495,976	495,976
Interlake													
From Ashtabula									12,115				12,115
From Buffalo				12,428									12,428
From Chicago			23,343	16,817									40,160
From East Chicago					53,398		42,701				(Slag) 12,050		108,149
From Sandusky									146,267				146,267
From Superior		46,418	11,464										57,882
From Toledo	197			36,632	3,876								40,705
From Canada (1)			36,508							150,054	60,240		210,294
Saginaw Total In	197	46,418	71,315	65,877	57,274	—	42,701	—	158,382	231,325	2,184,792	495,976	3,354,257
Saginaw Total Out	—	—	—	—	—	34,307	2,209	16,450	26,257	—	—	—	79,223
Saginaw Total	197	46,418	71,315	65,877	57,274	34,307	44,910	16,450	184,639	231,325	2,184,792	495,976	3,433,480

Note: (1) Excludes grain to Canada for export transshipment (200,775 tons)

Source: *Corps of Engineers Waterborne Commerce of the U.S. Maritime Administration, Office of Domestic Shipping*

(2) What, if any, channel or facility constraints impact present shipments.

(3) The shipper's total potential waterborne commerce, now and in the future, regardless of present routings or port constraints.

(4) The competitive factors - alternate routes and modes and their rates - that do or will reduce potential commerce to actual.

Most of these responses were generalized because rate and quantity information is usually considered proprietary. The responses were most specific about channel constraints. Where there were identificable benefits from channel deepening, users were willing to share estimates of the benefits. In addition to actual part users, a number of potential users were interviewed, principally grain and related industry. The most relevant interviews are summarized below:

- Dow Chemical. Dow uses Bay City principally for interplant shipments between Dow's Midland and Freeport, Texas plant complexes. The commodities involved are basic and intermediate chemicals, in bulk. To handle the full range of chemicals moving between the two plants, some of them exotic and/or small volume, Dow uses two "unit trains" operated by Missouri Pacific-C&O. These provide quick and dependable service, at presumably attractive rates.

  Shipments to customers, domestic and overseas, move out of the Midland plant overland, by truck and rail. Because of rate and service disabilities, Dow has in effect "written off" exports (or imports) via the Lakes. This is significant because for many years Dow was considered the single strongest proponent of direct overseas Great Lakes shipping. That decision had to be a painful one considering the corporate effort that had been dedicated to season extension and improvement of services. A reversal of that decision will be doubly difficult.

Dow does expect to continue use of the port, and in addition to interplant shipments, it is reasonable to expect bulk shipments from suppliers - such as benzene, toluene from Lakes area refineries - and bulk shipments to some customers. These will grow as the Midland Complex grows. Currently that plant's growth is on "hold" because of delays in the completion of the Consumers Power nuclear reactor that is to supply steam to Dow. If that problem is resolved, Midland will again be able to compete with other Dow plants for corporate expansion. A recent new movement via Bay City has been liquid caustic soda.

Dow's anticipated use of the Saginaw is for lake vessels. Those vessels - tankers and tank barges - are of such a size that the present channel depths are adequate, and are expected to continue so. The Dow refinery at Bangor/Bay City is shut down in order to maximize the feedstocks available to the new refinery at Dow's Freeport complex. This new refinery was built after Dow cancelled plans to expand the Bay City refinery. That planned expansion was based on use of imported feedstocks in a "Foreign Trade Zone" - a concept used in Puerto Rico. Because of the delay in federal approvals, those plans were overtaken by events.

Absent any need for channel dredging or a sponsor for a trade zone, and apparently feeling that dredging spoil disposal problems can be handled satisfactorily on any "ad hoc" basis as in the past, Dow sees no need now for a port authority. Dow recognizes that because of the present oil entitlements and allocation programs, it may be advantageous for a third party to operate their Bay City refinery. This could produce some new business for the port, but a corporate decision on that refinery is about six months off.

- Consumers Power. The most significant impact on port tonnages in recent years - and a negative one - was caused by Consumers' switch to coal deliveries by rail instead of vessel. Company executives said that for coal from their present sources, rail deliveries have a cost advantage of about 30¢ per ton. Unless air quality standards were changed, they expect to continue their present coal sourcing and transportation arrangements.

The coal movement to Consumers' Karn-Weadock plant in Hampton Township occasioned a long and famous lawsuit by the Lake Carriers Association - the so-called "Essexville case." The basis for the complaint was that railroads were offering lower rates for deliveries direct to Essexville than to lakeports for rail-vessel deliveries. Basically, this was because the railroads offered trainload rates direct, and single-car rates for transfer to vessels. Eventually the lake carriers prevailed, but it was an empty victory. The lower rates to lakeports apply from coal origins no longer used by the Karn-Weadock plant.

Because of air quality standards and limitations on stack emissions, the Karn-Weadock plant has to burn "low" sulphur coal. In lieu of the higher sulphur coal from Ohio and West Virginia which the plant formerly used, it now uses Kentucky coal. Other Consumers' plants have been given variances and continue to use the Ohio-West Virginia coal. Because of other emissions sources in the Bay City area - the cement plant, refinery, and foundries - a variance for the Karn-Weadock plant is unlikely. Stricter emission standards could force another change in coal sourcing, to "very low" sulphur western coals - as the preferred alternative to expensive stack scrubbing devices, and as Detroit Edison has done at Monroe. The possibility of stricter standards is unpredictable.

An anomoly created by the above: The Consumers' plant at Muskegan has a variance, burns Ohio-West Virginia coal, and receives the coal by vessel. That plant alone doesn't use enough coal to fulfill the minimum volume required on the rail-vessel rate. In order to "protect" the rail-vessel rate, the Karn-Weadock plant still receives some coal by vessel - about 150,000 tons per year - that is surplus to the Muskegan plant's needs. "This present movement of coal at Essexville may terminate in five years."

Consumers officials said the company has no plans for expansion of Karn-Weadock or additional fossil fuel plants in the hinterland. When their nuclear power plants in Midland are operational, they will be base-load plants, but there will not be a significant reduction in Karn-Weadock production. The power from

all plants is blended into the Consumer system, so the new plants will have no significant effect on power rates or availability in the area.

- Michigan Elevator Exchange. The grain elevator operations executives in Saginaw and Farm Bureau grain sales executives in Lansing are keenly interested in having a deeper channel. Seaway depths would be helpful both in export grain marketing and reducing costs (increasing the return to the producers) on present grain exports. Their estimated saving by being able to export direct instead of transshipping via lower St. Lawrence elevators as at present, is 13¢ per bushel - about $910,000 per year based on present volumes.

  The Elevator Exchange/Farm Bureau executives said that they have considered the Bay City area waterfront for a grain export facility, but the highway access for operations such as they have at Saginaw is inadequate. The executives are familiar with the "sattelite" waterfront elevator concept used in Toledo to serve the Anderson elevator in Maumee. They concede the concept might work at Saginaw/Bay City - but they would much prefer to have deeper water at their Saginaw elevator.

- Wickes Corp. Agricultural Division. Comments by executives at Wickes' Saginaw elevator were very much the same as those by Farm Bureau/Elevator Exchange officials. Deeper water was very attractive, a dual-elevator operation unattractive because of operational problems. Wickes is currently adding 1 million bushels of capacity at the Saginaw elevator, bringing capacity to 3.25 million bushels. The co-op elevator capacity is 2.15 million bushels.

  Both Wickes and the Farm Bureau are "direct" exporters, in that they contract with foreign buyers. Both use alternate port gateways, principally Toledo and Baltimore, because of seasonal and other factors. Both can and do use rail "trainload" and "unit train" rates to the Atlantic Coast ports. The Farm Bureau elevator loads about 10-12 vessels per year for direct shipment, Wickes about 6. They estimate they "pull" grain from an 80-100 mile radius, an indication their hinterland may be constrained by the channel depths.

Several other area grain companies not on the waterfront were contacted. These included Frutchey Bean Co., Wolverine Bean/Auburn Feed & Grain, Reese Farmers Co-op, and William Mueller & Son. These elevators operate as "terminal" elevators, buying direct from producers and other elevators, and selling to other grain companies including some exporters - but do not sell "direct export."

- Agrico Chemical Co. Representative of several fertilizer operations in the area (Smith-Douglas, Farm Bureau, Wickes and W. R. Grace), Agrico brings in bulk fertilizer materials by rail, for formulating and/or packaging. The primary sources of Agrico's materials are the parent Williams Companies' plants in the south, and materials are barged to the Cincinnati area, and railed to Saginaw. Agrico's bulk warehouse at Saginaw is near the waterfront, and there is a possibility that all-water routings will be initiated.

- Michigan Sugar/Monitor Sugar Companies. The two companies are independent, but they are merged here because both export sugar beet pulp pellets.

  Michigan Sugar has been supplying the pellets exported via the new pellet-handling plant at Bay City. Monitor Sugar at Bay City, presently exports via a facility at Port Huron. The sugar companies do not export direct, but sell to an exporting firm. The Bay City facility is owned locally (J. Wirt) but is contracted to the exporting firm, I. S. Joseph Co. of Minneapolis. Although the sugar companies do not control their pellet exports, it is - or would be - advantageous to them to use the Bay City facility.

  Present volume through the facility was estimated to be 30,000 tons a year. Total potential volume was estimated to be about 90,000 tons, based on the sugar beet acreage harvested and the beets processed by both companies. Achieving this potential will require expansion of the facility's storage because the beet processing peak - November to February - coincides with the seasonal close of navigation. Some pellets are exported before the close. The balance has to be carried over.

Historically, and for the foreseeable future, the market for the animal feed pellets has been export - either to Europe or Japan. The preferred method of shipping pellets, and in effect the only way because transshipment is impractical, is to load oceangoing vessels direct, hence Seaway depths at Bay City would be advantageous. In the past, the companies used to ship by-product molasses to industrial users via lake vessel using the Westway Trading tank at Fletcher Oil in Bay City. A vessel is no longer available to handle the molasses, so it now moves by rail.

- Aetna Cement/Huron Cement. These two companies are also unrelated except as to product, and in fact are competitors. The Aetna plant grinds clinkers received by lake vessel from the parent company, Lake Ontario Cement. Formerly, as an independent and under Martin-Marietta ownership, the plant also calcined (burnt) the raw stone. The Huron plant receives finished cement in bulk from the National Gypsum mill in Alpena.

  In both cases the company representatives indicated the plants were operating below capacity - about 150,000 tons and 450,000 tons for Huron and Aetna, respectively - because of market constraints. Despite the relatively limited channel at Saginaw, only one out of the six vessels in the National Gypsum fleet could not use the channel - and that vessel was precluded from using the terminal because of terminal constraints. Full Lakes or Seaway depth at Essexville would be advantageous to Aetna in order to use larger vessels.

- Stone Companies. Several companies handling stone on a terminal or proprietary basis, or for internal use were contacted. These included Jack Wirt, Carrollton Concrete Mix, Sand & Stone, Inc., Midland Contracting and Saginaw Rock Products. They were in general agreement that deeper channels to permit use of larger vessels would produce cost savings. They were equally unanimous in reluctance to forecast future volumes.

- Oil Companies. The companies maintaining waterfront terminals at Bay City were contacted. These included Total Petroleum, Amoco Oil, Union Oil, Fletcher Oil and Enterprise Oil. These terminals are centered in

the port area because of the former importance of vessel receipts of petroleum products. Now, substantially all of product movement is via Buckeye Pipeline, with a pipeline network that connects with most refineries in the midwest. Total's pipeline (formerly Michigan-Indiana Pipeline) also provides connection with central Michigan refineries. Channel constraints are no longer significant to these companies.

- Oglebay Norton Company. Cleveland-based Oglebay is one of the major operators of lake vessels, as part of its minerals and ores business. Formerly it operated marine terminals at a number of lake ports including Bay City (Bay City Seaway Terminal, owned by Dow) and Saginaw/Carrollton (owned and operated by Oglebay). The Saginaw facility was inactive for several years, and was recently sold to L. Surath & Sons, Inc.,the Bay City-based scrap firm. The operation of the Dow-owned facility was terminated with the close of the 1976 navigation season.

  The former manager of the Bay City Seaway Terminal indicated that Oglebay's decision to cease operations was based on the low and declining volume of general cargo business, rather than losses incurred or a complete absence of business. Marketing efforts were successful to the extent that in later years the terminal was "pulling" cargo across the state - such as cherries from Traverse City. However, there had been a constant attrition of the local cargos that traditionally moved through the port - dry beans and chemicals - because of containerization and attractive container rate combinations via tidewater and Canadian ports. Containerization had been a double blow, because handling the truck-sized boxes on and off ships required the commitment of heavy and expensive cranes for use at Bay City. Absent a good volume of other heavy cargo requiring cranes - such as the import steel handled at Detroit and several other ports - the cost of these cranes became prohibitive on the volume of containers moving through the port.

  Prior to containerization, sacks of dry beans had been a regular movement through the port, and these shipments were handled with ship equipment and minimal shore equipment. After introduction of the

marine container in the 1950's, it became apparent that beans were an ideal "containerizable" cargo. That method of shipment protected the quality of the beans, and with an almost perfect weight-volume relationship for containers, the freight rates were very favorable. There is a substantial export of Michigan beans. These are containerized in the Saginaw ports' hinterland, but the containers are trucked to the Detroit gateway for movement via Canadian ports, and to a lesser extent U.S. tidewater ports.

The impact of containerization on the bean movement was verified during interviews at Farm Bureau and other facilities handling beans, including Wickes Corp. Michigan Bean Division, former owner/operator of the Saginaw Valley Marine Terminal at Bay City.

- Waterfront Industry. A substantial amount of local industry is located on or near the waterfront because of the proximity of railroads. Interviews included the following:

  Bay Chemical Co. Operations involve making acid solutions. Raw materials received by rail, river used for cooling water only.

  H. Hirschfield Sons Co. Rail, not water transport, used for lumber and steel received. They have loaded scrap to vessels, but anticipate routing any future shipments via Detroit because of possible water pollution from oil drippings - partly a facility problem.

  Defoe Shipbuilding. The yard ceased operations some years ago. The owners made a special effort to minimize impact on the community by helping their workers to find employment in other yards, elsewhere. Of necessity, this dispersed many of the workers who might have been an attraction to revival of shipbuilding at Bay City. The owners indicated no plans for utilizing the property.

American Hoist/Brownhoist. Company executives could not give forecasts of future level of activity. Their waterfront location has been utilized occasionally for shipments of oversize cranes by vessel. It would be desirable to preserve that option, but the amount of future use could not be predicted.

General Motors-Saginaw. The Chevrolet plant complex on the river - Grey Iron Castings, Nodular Iron Castings and Parts Plants - receive most of the sand moving on the Saginaw. Company executives did not give forecasts of future sand volumes or possible use of river for coal receipts.

Shipper Interview Summary

The interview process identified the following areas of special interest:

- significant benefits to grain producers from a deeper channel and/or a new Bay City facility.
- possibly significant benefits to stone and cement receivers from a deeper channel.
- cargo growth potential in fertilizers, chemicals, grains and pellets.
- possible revival of petroleum movements depending on reactivation of the Dow refinery.
- possible revival of coal receipts depending on utility coal sourcing and transportation rates.
- significant problems that must be resolved before revival of general cargo traffic.

Economic Analysis

The purpose of this section is to provide a basis for forecasting future traffic flows on the Saginaw, and where feasible, identify the total commodity flows into or out of the port hinterland. The analysis is by economic sectors that roughly equate with classes of port traffic:

- Manufacturing - General Cargo and Bulk Chemicals;
- Agriculture - Grains and Fertilizers;
- Construction - Sand, Stone and Cement; and
- Energy - Coal and Petroleum Fuels.

A reference used frequently in this section is the 1972 OBERS Projections of Regional Economic Activity in the U.S. by the U.S. Water Resources Council, including the 1974 revision. WRC's Subarea 408 approximates the Saginaw's hinterland for construction and energy materials. That subarea plus Subareas 406 (the northwest quadrant of the Lower Peninsula) and 407 (northeast quadrant of the Lower Peninsula) approximate the "General Cargo" and "Agriculture" hinterlands, defined in a preceeding section. The specific counties included in WRC subareas are:

- Subarea 408: Arenac, Bay, Clare, Genesee, Gladwin, Gratoit, Huron, Iosco, Isabella, Lapeer, Midland, Saginaw, Tuscola. (14)
- Subarea 407: Alcona, Alpena, Cheboygan, Crawford, Montmorency, Oscoda, Ostego, Presque Isle. (8)
- Subarea 406: Allegan, Antrium, Benzie, Charlevoix, Emmet, Grand Traverse, Ionia, Kalkaska, Kent, Lake, Leelanau, Manistee, Mason, Mecosta, Missaukee, Montcalm, Muskegan, Newago, Oceana, Osceola, Ottawa, Wexford. (22)

Manufacturing Sector Analysis

The 1974 revised forcasts by the Water Resources Council for manufacturing activities in the subareas that equate with

the Saginaw hinterland(s) are reproduced in the following tables.

TABLE IV-13
ESTIMATED EMPLOYMENT EARNINGS IN MANUFACTURING
NORTHWEST LOWER MICHIGAN PENINSULA - 22 COUNTRIES
(In Thousands of 1967 Dollar)

	1980	1985	1990	2000	2020
Manufacturing	451,600	510,500	577,100	750,700	1,211,900
Food and kindred products	32,400	35,100	38,100	45,100	61,600
Textile mill products	(S)	(S)	(S)	(S)	(S)
Apparel and other fabric products	2,300	2,400	2,600	2,900	3,700
Lumber products and furniture	21,800	22,500	23,300	25,900	31,500
Paper and allied products	25,100	29,200	34,000	46,100	77,300
Printing and publishing	9,200	10,600	12,200	16,100	25,200
Chemicals and allied products	28,700	37,500	49,000	78,400	164,800
Petroleum refining	2,900	3,200	3,400	4,000	5,500
Primary metals	80,900	82,900	85,000	90,900	104,800
Fabricated metals and ordnance	36,000	43,900	53,500	77,700	142,100
Machinery, excluding electrical	125,800	142,500	161,400	208,700	329,500
Electrical machinery and supplies	21,000	27,800	36,700	59,900	129,700
Motor vehicles and equipment	10,400	11,100	11,800	13,900	18,700
Transportation equip., excl. mtr. vehs.	2,600	2,800	2,900	3,300	4,100
Other manufacturing	51,800	56,900	62,500	77,100	112,600

Source: WRC/OBERS, Subarea 406.

TABLE IV-14
ESTIMATED EMPLOYMENT EARNINGS IN MANUFACTURING
NORTHEAST LOWER MICHIGAN PENINSULA - 9 COUNTRIES
(In Thousands of 1967 Dollar)

	1980	1985	1990	2000	2020
Manufacturing	69,100	79,700	91,900	123,200	206,200
Food and kindred products	(S)	(S)	(S)	(S)	(S)
Textile mill products					
Apparel and other fabric products	1,400	1,600	1,900	2,600	4,400
Lumber products and furniture	6,200	7,000	7,800	10,100	15,700
Paper and allied products	18,600	22,200	26,300	36,400	62,600
Printing and publishing	1,100	1,200	1,500	1,900	3,100
Chemicals and allied products	(S)	(S)	(S)	(S)	(S)
Petroleum refining					
Primary metals	2,400	2,700	3,000	3,700	5,200
Fabricated metals and ordnance	7,100	8,500	10,100	14,300	25,400
Machinery, excluding electrical	9,600	9,700	9,800	10,500	12,200
Electrical machinery and supplies	4,200	5,300	6,800	10,700	21,900
Motor vehicles and equipment	(S)	(S)	(S)	(S)	(S)
Transportation equip., excl. mtr. vehs.	(S)	(S)	(S)	(S)	(S)
Other manufacturing	17,400	20,200	23,500	31,800	54,500

Source: WRC/OBERS, Subarea 407.

TABLE IV-15
ESTIMATED EMPLOYMENT EARNINGS IN MANUFACTURING
SAGINAW BAY AREA OF MICHIGAN - 14 COUNTIES
(In Thousands of 1967 Dollar)

	1980	1985	1990	2000	2020
Manufacturing	2,563,100	3,010,100	3,535,100	4,846,000	8,265,800
Food and kindred products	50,500	57,400	65,300	83,600	128,600
Textile mill products	(S)	(S)	(S)	(S)	(S)
Apparel and other fabric products	4,100	4,500	5,100	6,200	9,100
Lumber products and furniture	10,200	11,300	12,500	15,600	23,100
Paper and allied products	7,000	8,300	9,700	13,200	22,300
Printing and publishing	33,500	41,000	50,200	73,400	138,600
Chemicals and allied products	261,300	311,500	371,300	525,300	940,300
Petroleum refining	18,000	20,700	23,900	31,100	48,400
Primary metals	188,400	211,000	236,300	289,000	410,800
Fabricated metals and ordnance	215,700	255,800	303,400	424,700	740,400
Machinery, excluding electrical	74,200	82,900	92,600	119,000	186,700
Electrical machinery and supplies	45,200	55,400	67,900	99,900	187,800
Motor vehicles and equipment	1,588,500	1,873,500	2,209,500	3,049,100	5,237,400
Transportation equip., excl. mtr. vehs.	20,900	22,400	24,000	28,000	37,800
Other manufacturing	44,800	52,800	62,400	87,000	153,300

Source: WRC/OBERS, Subarea 408

The WRC/OBERS forecasts by subarea have been aggregated in the following table.

TABLE IV-16
ESTIMATED EMPLOYMENT EARNINGS IN MANUFACTURING
SAGINAW PORTS GENERAL CARGO HINTERLAND
(IN THOUSANDS OF 1967 DOLLARS)

	1980	1990	2000	2020
Manufacturing	3,083,800	4,204,100	5,719,900	9,683.900
Food Products	82,900	103,400	128,700	190,200
Textile Products	(1)	(1)	(1)	(1)
Apparel & Products	7,800	9,600	11,700	17,200
Lumber Prod.&Furn.	38,200	43,600	51,600	70,300
Paper & Products	50,700	70,000	95,700	162,200
Printing & Publish.	43,800	63,900	91,400	166,900
Chemical & Products	290,000	420,300	603,700	1,105,100
Oil Refining	20,900	27,300	35,100	53,900
Primary Metals	271,700	324,300	383,600	520,800
Fabricated Metals	258,800	367,000	516,700	907,900
Machinery,non-elec.	209,600	263,800	338,200	528,400
Machinery, elec.	70,400	111,400	170,500	339,400
Motor Vehicles & Eqpt.	1,598,900	2,221,300	3,063,000	5,256,100
Transport Equip.	23,500	26,900	31,300	41,900
Other Mfg.	114,000	148,400	195,900	320,400

Note: (1) Insufficient companies in sample

SOURCE: TERA, from WRC/OBERS

As shown in Tables 13, 14, 15, each of the hinterland's subareas has a different dominant manufacturing activity now. Respectively, Non-electrical Machinery in the Northwest, Paper and Paper Products in the Northeast, and Motor Vehicle Equipment in the Saginaw Bay area. The OBERS forecasts indicate that these dominant activities will continue through the year 2020 in each case.

The OBERS forecasts do predict shifts in the relative importance of the individual manufacturing activities. Specifically, in the case of the combined subareas representing the Saginaw ports' hinterland, the following shifts occur in the ranking of the top five activities:

Rank	1980	2000	2020
1	Motor Vehicles	Motor Vehicles	Motor Vehicles
2	Chemicals	Chemicals	Chemicals
3	Primary Metal	Fabricated Metal	Fabricated Metal
4	Fabricated Metal	Primary Metal	Machinery
5	Machinery	Machinery	Primary Metal

The differential growth rates predicted by OBERS for the various manufacturing activities in the combined Saginaw hinterland are shown in the table below.

TABLE IV-17

GROWTH INDEXES FOR MANUFACTURING ACTIVITIES IN SAGINAW HINTERLAND (BASE YEAR 1980 EQUALS 100)

	1990	2000	2020
Manufacturing	136	185	314
Food Products	125	155	229
Textile Products	-	-	-
Apparel & Products	123	150	221
Lumber Prod.	114	135	184
Paper & Products	138	189	320
Printing & Publish.	146	209	310
Chemicals	145	208	381
Oil Refining	131	168	258
Primary Metals	119	141	192
Fabricated Metals	142	200	351
Machinery, non-elec.	126	161	250
Machinery, elec.	158	242	482
Motor Vehicles & Equip.	139	192	329
Transport Equip.	114	133	173
Other Mfg.	130	172	281

Manufacturing Activity Analysis

The OBERS forecasts will be revised and reissued later in 1980. Hence this brief review of the top five manufacturing activities to estimate appropriate adjustments in the OBERS-derived growth indexes.

- Motor Vehicles & Equipment. 1980 employment in U.S. auto plants is down about in line with the decrease in U.S.-made auto sales - about 35%. The OBERS' 1980 forecasts are therefore grossly over-estimated. A one-year aberration is not fatal since the forecasts are based on multiple years. More significant to the forecasts are (1) changes in buying patterns - contraction in markets and loss of market to imports, and (2) changes in manufacturing processes - more automation. The market factors affect port tonnages, the latter affect employment. To be conservative in cargo tonnage forecasts, the OBERS "motor vehicle" growth rates will be halved.

- Chemicals. Dow dominates the chemicals category, hence it is significant that that company's growth is likely to be constrained at Midland by air quality requirements. When the nuclear power plants begin supplying steam, there will be "room" for plant expansion. With this qualification, the OBERS-derived index is considered applicable.

- Fabricated Metals. Much of this activity in the hinterland is automotive-related. Although the number of parts per car may not change significantly, tonnages will be affected by redesign and market contraction. The OBERS growth rates will be reduced 25%.

- Machinery. Currently, machinery activities may be ahead of OBERS forecasts because of retooling needs. Other forecasts indicate good future markets for machinery makers subject to plant capacity limitations - which have introduced import substitution. The OBERS forecasts will not be adjusted.

- Primary Metals. The OBERS forecasts recognized a reduction in growth rates. Much of this activity is automotive-related. Although unit volume may

continue, tonnages will be affected by lighter unit weight. A 10% reduction will be made to OBERS' rates.

Estimated Cargo Growth Rates. Adjusting the OBERS estimates in line with the above gives the following "all manufacturing" employment income forecasts and indicated growth rates:

TABLE IV-18
ADJUSTED EMPLOYMENT INCOME AND GROWTH INDEXES
FOR MANUFACTURING IN THE SAGINAW HINTERLAND
(EMPLOYMENT IN THOUSANDS OF 1967 DOLLARS)

	Income	Index
1980	$ 3,083,800	100
1990	3,860,590	125
2000	4,912,185	159
2020	7,668,115	249

SOURCE: TERA

Applying the adjusted growth indexes to the general cargo imports and exports identified in the hinterland analysis gives the following:

Year	Index	Short Tons
1977	86.5	67,024.03
1980	100.0	77,734.45
1990	145.0	112,714.95
2000	208.0	161,687.65
2020	381.0	296,168.25

Agricultural Sector Analysis

The 46 counties in the Saginaw ports' agricultural hinterland were identified in the hinterland analysis section. They are shown in Table IV-19, with their 1974 production of major export grains.

TABLE IV-19
1974 GRAIN PRODUCTION FOR SAGINAW HINTERLAND COUNTIES
(Acres and Bushels in Thousands)

County	Harvested Acres	Corn	Wheat	Soybeans
Alcona	31	40	25	.3
Alpena	46	93	53	.7
Antrim	30	247	19	-
Arenac	59	566	204	32.2
Bay	144	1,669	878	94.5
Benzie	15	22	1	-
Charlevoix	26	188	10	-
Cheboygan	27	39	2	-
Clare	45	232	63	.6
Clinton	210	3,457	1,180	691.0
Crawford	-	2	-	-
Emmet	24	94	6	.1
Genesee	120	1,874	648	326.3
Gladwin	52	531	123	13.6
Grand Traverse	42	253	41	1.2
Gratoit	228	4,683	1,325	593.1
Huron	348	5,485	2,276	151.4
Ionia	190	3,613	1,071	102.6
Iosco	31	130	40	3.1
Isabella	156	2,379	677	58.5
Kalkaska	8	60	4	.2
Kent	173	2,455	432	5.1
Lake	13	27	14	-
Lapeer	170	2,255	671	17.5
Leelanau	40	164	16	.1
Manistee	29	73	30	-
Mason	62	586	189	.7
Mecosta	82	683	161	.3
Midland	67	1,077	346	168.7
Missaukee	61	381	55	-
Montcalm	170	2,093	856	44.8
Montmorency	15	28	14	-
Muskegon	57	538	89	-
Newaygo	87	816	144	7.6
Oceana	81	377	108	.1
Ogemaw	44	226	53	-
Osceola	73	266	74	.7
Oscoda	13	51	1	-
Otsego	16	32	9	-
Presque Isle	49	36	19	1.7
Roscommon	2	-	-	-
Saginaw	275	4,110	1,737	1,517.2
Sanilac	357	3,847	1,717	121.9
Shiawassee	195	2,768	1,042	1,012.1
Tuscola	285	5,965	1,950	104.5
Wexford	26	68	27	-
Total	4,274	54,579	18,400	5,072.4
% State	53.4%	48.4%	57.7%	42.0%
Total State	8,005	112,670	31,891	12,080

A comparison of 1974 grain production in the Saginaw hinterland and 1974 grain exports via the port is as follows:

Grain		Exports via Port	
Type	Bu.Produced	Short Tons	Bu.Equivalent
Corn	54,579,000	116,230	4,151,038
Wheat	18,400,000	23,480	782,588
Soybeans	5,072,400	66,015	2,200,280
Total	78,051,400	205,725	7,133,906

Table IV-19 indicates that the Saginaw hinterland accounts for about half of Michigan's production of the principal export grains. About a dozen counties within the hinterland account for most of its production. About twenty counties outside the hinterland along the south border of the state account for most of the balance of state production.

The 1974 comparison of hinterland production and exports via Saginaw ports shows the equivalent of about 10% of hinterland production exported via the port. This direct export movement is below the share of national corn, wheat and soybean production that moves export, as shown in the following figures from the U.S. Department of Agriculture, Foreign Agriculture Service.

TABLE IV-20
U.S. EXPORTS AS A PERCENT OF GRAIN PRODUCTION

	CROP YEARS	
GRAIN	1978-79	1977-78
Corn	29%	28.5%
Wheat	66%	60.5%
Soybeans	43%	44.5%

The Saginaw hinterland grain production is relatively less favorably situated for domestic markets than grain in the south part of the state - or grain production elsewhere in the midwest, or much of the U.S. It is likely that hinterland exports would be higher than the national averages if all other factors were equal. The lower actual percentage shipped through the port is an indication of constraints due to the navigation season and channel depth - and the volume of hinterland grain that is moving via other ports.

The previously referenced Novey study[2/] showed a similar participation by Saginaw ports in export of hinterland grain for 1965-73 period. It also showed significant growth in the hinterland production of corn and soybeans during that period - 85% and 100%, respectively - with wheat production flat. The following table brings production figures to the latest available year:

TABLE IV-21
PRODUCTION AND DISPOSITION OF MICHIGAN CROPS
(IN THOUSANDS OF BUSHELS)

Crop		Production	Farm Use	Sold
Corn (for grain)	1974	110,410	40,852	69,558
	1975	152,800	45,840	106,960
	1976	153,870	46,161	107,709
	1977	191,250	53,550	137,700
Wheat	1974	37,600	2,560	36,057
	1975	38,760	2,657	37,153
	1976	33,060	1,785	31,275
	1977	33,000	4,356	28,644
Soybeans	1974	13,230	709	12,829
	1975	15,860	668	15,480
	1976	11,583	429	11,154
	1977	20,880	543	20,337

SOURCE: Michigan Agricultural Statistics, by Michigan Crop Reporting Service, 1977 Ed.(1974-75), 1978 Ed.(1976-77).

2/ Novey, Sarker, Hales, op.cit., page 42

The WRC/OBERS forecasts for agricultural production converted to growth indexes, give the following:

TABLE IV-22
GROWTH INDEXES FOR AGRICULTURAL PRODUCTION
IN SAGINAW HINTERLAND
(ALL CROPS EXCEPT HAY AND SILAGE)

WRC Subarea	1980	2000	2020
406 - NW Lower Peninsula	100	125	157
407 - NE Lower Peninsula	100	114	132
408 - Saginaw Bay Area	100	130	164
Combined Hinterland(1)	100	129	162

Note: (1) Weighted average

SOURCE: TERA, from WRC/OBERS, 1972 Ed.

The OBERS-derived indexes give an overall annual growth rate of 1.5% that compares with 5% to 10% for corn and soybeans in Table 21 and the Novey figures. With total farmland acreage stable, the increases are produced by market incentives and more intensive cultivation. Accordingly, this study assumes 2.5% annual growth for corn and soybeans, zero for wheat. The study projects the following production of exportable grains in the Saginaw hinterland, based on generalized 1977 statewide off-farm sales in Table 21, and the hinterland shares of state production in Table 19.

TABLE IV-23
ESTIMATED EXPORTABLE GRAIN PRODUCTION IN
SAGINAW HINTERLAND
(IN THOUSANDS OF BUSHELS)

	1977 Actual		Estimated		
Grain	State	Hinterland	1980	2000	2020
Corn	140,000	67,760	72,842	109,263	145,684
Wheat	30,000	17,310	17,310	17,310	17,310
Soybeans	20,000	8,400	9,030	13,545	18,061
Total	190,000	93,470	99,182	140,118	181,055

Fertilizer Consumption. Fertilizer consumption is related to crop production, but the correlation is affected by weather conditions. Absent any county-by-county statistics on fertilizer consumption, the statewide consumption has been allocated to the Saginaw hinterland based on the harvested cropland shown in Table 19.

TABLE IV-24
ESTIMATED FERTILIZER CONSUMPTION IN
SAGINAW HINTERLAND
(IN SHORT TONS)

Year	Total Michigan	Estimated Hinterland
1973	896,523	478,743
1974	1,016,000	542,544
1975	849,136	453,439
1976	1,053,817	562,738
1977	1,195,006	638,133

SOURCE: Michigan Agricultural Statistics, op. cit.

Although cropland acreage is relatively constant, at a level well below its historical peak, there is a discernable growth in fertilizer usage. The nitrogen component is usually petrochemical-based, and this has increased prices inordinately. Unlike some areas that emphasize nitrogen, Michigan fertilizer use involves more-or-less equal amounts of the three major components - phosphoric acid and potash, as well as nitrogen. Application rates may not go up as much as the fertilizer companies had planned, but growth in line with the OBERS rate can be expected. Since virtually all fertilizer materials are produced outside Michigan - much of it in the south and moved north by barges - fertilizers are a good candidate for movement through the port.

Estimated fertilizer use in the Saginaw hinterland - potential port traffic - is as follows:

Year	Index	Short Tons
1977	96.5	638,133
1980	100.0	661,278
2000	129.0	853,049
2020	162.0	1,071,270

Sugarbeet Pulp Pellets. The pulp by-product of beet processing represents approximately 6% of the harvested weight of the sugar beets. Virtually all of the pulp is compressed into animal feed pellets. The primary market for the pellets is export. Trends in beet production are as follows:

TABLE IV-25
SUGAR BEET HARVESTED ACREAGE AND PRODUCTION
(PRODUCTION IN THOUSANDS OF SHORT TONS)

Year	Statewide		Saginaw Hinterland	
	Acres	Tons	Acres	Tons
1973	86,700	1,524.0	82,920	1,470.5
1974	80,400	1,364.0	76,630	1,316.3
1975	NA	NA	NA	NA
1976	91,400	1,540.0	87,310	1,471.1
1977	85,500	1,796.0	81,450	1,713.2
1978	91,500	1,770.0	80,500	1,561.9

SOURCE: Michigan Agricultural Statistics, op. cit.

There is no predictable production trend. Sugar beet pulp pellet production in the Saginaw hinterland can be assumed stable, at the 90-100,000 ton per year level.

Dry Beans. Michigan bean exports were the mainstay of general cargo service at Saginaw ports in the past. They are presumably included in the general cargo identified in the hinterland analysis. An estimated 25% of Michigan bean production is exported, hence this summary of production:

TABLE IV-26
DRY BEAN HARVESTED ACREAGE AND PRODUCTION
(IN THOUSANDS OF ACRES AND HUNDREDWEIGHTS)

Year	Statewide		Saginaw Hinterland	
	Acres	Production	Acres	Production
1974	575	6902	506	6065
1975	500	4500	438	4032
1976	545	5450	475	4730
1977	480	5664	412	4827
1978	560	6440	487	5491

There is no predictable trend in bean production in the Saginaw hinterland. Projecting the above gives about 275,000 tons per year production in the hinterland, 65-70,000 tons per year for export at 25%.

Construction Sector Analysis

The Water Resources Council/OBERS Subarea 408 approximates the market area for construction aggregates and cement shippers via Saginaw ports. The 44 county area county area was identified by port users handling those products and defined in the hinterland analysis. There is an anomoly in that the hinterland includes a substantial gypsum mining and processing activity concentrated in Iosco County that is oriented to markets outside the hinterland - and this does not move via Saginaw ports. There is lime production and some limestone production within the hinterland, but that is oriented to agricultural and industrial use. Most limestone used in the hinterland comes from sources centered around the Straits of Mackinac on both Michigan peninsulas. It also represents most of the tonnage moving through the Saginaw ports.

In brief, the Saginaw limestone and cement movements are market rather than production oriented - as was the case with agriculture. The 1974 revised WRC/OBERS forecasts for employment earnings in construction are as follows:

TABLE IV-27
ESTIMATED EMPLOYMENT EARNINGS IN CONTRACT CONSTRUCTION
IN THE SAGINAW HINTERLAND
(EARNINGS IN THOUSANDS OF 1967 DOLLARS)

Year	Earnings	Growth Indexes
1970	$ 150,712	64
1980	235,900	100
1990	333,200	141
2000	467,100	198
2020	829,400	352

SOURCE: WRC/OBERS

The OBERS forecasts indicate a construction growth rate generally between 5% and 6%. This is more than twice the final growth rates used for all manufacturing and agriculture. It is, in brief, unrealistic for highway and heavy construction, the local market for aggregates. Using a 1% growth rate gives the following forecasts: (in short tons)

Year	Index	Stone	Cement and Cement Clinker
1968-77	98	2,015,770	206,462
1980	100	2,056,908	210,676
1990	110	2,262,599	231,744
2000	120	2,468,290	252,811
2020	140	2,879,671	294,946

Sand. Construction sand is sourced locally in the hinterland, and the sand moving via the port is for industrial use. The Bay-dredged sand is of high quality, and if use of southeastern Michigan dunes sand is curtailed, use of the Bay sand may be increased in local foundries, or shipments outside the hinterland resumed.

Conservatively, the sand movement is expected to grow with the growth factor for hinterland primary metals manufacturing as adjusted (OBERS, - 10%) as follows:

Year	Index	Tons
1968-77 av.	98.5	440,583
1980	100.0	447,292
1990	107.0	478,602
2000	128.0	572,534
2020	173.0	773,815

Energy Sector Analysis

The market area for petroleum terminals on the Saginaw was used to define the port's energy materials hinterland. This 19-county area includes power plants at Essexville and Harbor Beach. Subsequent analysis showed that electricity consumption in this hinterland coincided closely with the power generation of these plants, and the hinterland boundaries were appropriate. The 19-county area does not coincide with any WRC/OBERS forecast area.

The residual oil and coal used in power production originates outside the hinterland. Only part of the latter, and a portion of industrial coal consumed in the hinderland actually moves via the Saginaw. Virtually all of the petroleum fuels (and all gas) used in the hinterland, originate in the hinterland or move into the hinterland via pipeline. This energy analysis is to determine whether future consumption will require more use of the Saginaw. Present energy consumption is shown in the following table:

TABLE IV-28
ENERGY CONSUMPTION IN SAGINAW HINTERLAND
1976-77-78 Averaged

County	Electricity[1] (000 KWH)	Gas (mm cf)	Gasoline (000 gal)	Fuel Oil (000 gal)
Alcona	48,140	248	4,781	2,384
Alpena	119,137	3,197	16,035	8,558
Arenac	78,417	366	13,389	3,409
Bay	832,970	11,747	45,740	13,037
Clare	123,620	758	18,974	5,859
Crawford	77,117	457	15,364	3,532
Genesee	3,693,107	35,554	211,852	40,606
Gladwin	88,710	388	9,849	2,874
Gratoit	332,043	3,734	23,650	11,813
Huron	247,097	1,829	22,977	17,521
Iosco	169,347	1,666	11,850	3,787
Isabella	213,757	2,594	24,068	6,746
Midland	1,312,247	12,366	21,869	6,384
Montmorency	31,217	-	5,584	2,235
Ogemaw	117,853	462	6,621	2,419
Oscoda	43,433	-	4,782	3,762
Roscommon	99,573	930	12,772	4,047
Saginaw	2,805,463	24,567	113,510	29,647
Tuscola	282,763	1,946	26,903	14,210
Total Hinterland	10,716,011[1]	102,809	610,570	182,830
% State	14.9%	11.5%	12.3%	12.6%
Total State	72,081,006	890,254	4,983,715	1,454,977

Note: (1) Equivalent coal consumption for hinterland electricity with 9700 btu heat rate, 12,500 btu/lb. coal is 4,157,812 short tons. Actual hinterland consumption of utility fuels in 1979 as follows:

Plant	Coal (000 tons)	Resid.Oil(000 bbl)
KARN 1 & 2	1,261.0	25.5
KARN 3 & 4	-	7,755.0
WEADOCK	743.7	373.5
HARBOR BEACH	277.0	26.0
Total	2,281.7	8,180.0

SOURCE: TERA from Michigan Department of Energy, and Michigan Public Service Commission.

Michigan Department of Energy forecasts are for energy materials. These have been used to produce the following growth indexes:

TABLE IV-29
MICHIGAN CONSUMPTION OF ENERGY MATERIALS
(IN QUADRILLION BTU EQUIVALENTS)

Energy Material	1977 Actual	2000 Estimate	Growth Index
Oil	1.156	1.219	105
Nuclear	.116	.484	417
Gas	.873	.580	066
Hydro	.012	.021	175
Coal	.725	1.578	214
Other	-	.194	NA

In lieu of forecasts for electricity production/ consumption, Michigan DOE provided 1960-1978 historical data on Michigan consumption. Regression analysis gave a compound annual growth rate of 3.7%. This compares with a 3% rate presently assumed by Consumers Power for planning purposes[3/], and a 2.23% rate calculated on the shorter historical series for the hinterland only. This study has assumed a 2.25% rate. This gives growth indexes of 107.7 and 173.8 for 1980 and 2000, respectively, using a 1977 base.

3/ Ray T. Schwimer, Senior Consultant Community Services, Jackson, Michigan.

Table 27 hinterland energy consumption projected with the preceding growth indexes would be:

Year	Electricity (000 KWH)	Gas (mmcf)	Gasoline (000 gal)	Fuel Oil (000 gal)
2000	18,913,759	67,854	641,099	191,972
2020	31,921,110	44,784	673,154	201,571

Assuming Consumers' Midland nuclear plants will be operated as base load plants after completion in 1983-84, the future hinterland production of electricity by various fuels is anticipated to be as follows:

TABLE IV-30
ESTIMATED HINTERLAND POWER PRODUCTION BY FUEL

Plant	Fuel	Rated Cap. (MW)	Load Factor	Annual Output (000 KWH) 2000	2020
Harbor Beach	Coal	121	60%	635,976	635,976
Midland	Nuc.	1,357	70%	8,321,124	8,321,124
Karn #1 & 2	Coal	530	60%	2,785,680	2,785,680
Weadock	Coal	500	60%	2,628,000	2,628,000
Karn #1 & 2	Oil	1,230	42%	4,542,979	-
New	Coal	3,330	60%	-	17,550,979
Total				18,913,759	31,921,110

Existing Consumer plants will be adequate through 2000 with the nuclear plant operating and provided oil is available to fuel Karn #3 and 4 (alternately, it may be converted to coal). By 2020, there will be an annual deficit in generating capacity of about 11,000,000,000 KWH - or about 2100 megawatts of new plant will be needed at 60% load factor. New capacity added will likely be coal fueled. It is also likely that sufficient capacity will be added to replace the oil burning plants - or about 3330 megawatts total. Older coal-fired units may also be replaced. KWH's converted to coal are as follows:

TABLE IV-31
ESTIMATED HINTERLAND UTILITY/INDUSTRIAL COAL CONSUMPTION
(EXCLUDING DETROIT EDISON-HARBOR BEACH STATION)

Year	000 KWH from Coal	Coal in Short Tons	
		Utility(1)	Industrial(2)
1980	5,295,923	2,054,818	922,613
2000	5,413,680	2,100,508	943,128
2020	22,964,659	8,910,288	4,000,719

Notes: (1) Based on rated capacity at 59%, 9700 btu heat rate, 12,500 btu/lb. coal.
(2) Derived from Coal Transportation and Use in Great Lakes Region. Great Lakes Basin Commission 1978, pg. 6. (Utility coal 69%, industrial coal 31% of regional coal shipments.)

SOURCE: TERA

The Consumers plant site at Essexville appears capable of accommodating the additional plants needed by 2020. It is doubtful that present transportation - and Bay City grade crossings - could accommodate the coal volume involved.

Most petroleum products distributed in the hinterland are produced in the hinterland or arrive via pipeline. The petroleum fuels situation is summarized by the following table:

TABLE IV-32
PETROLEUM PRODUCTS SUPPLY/DISTRIBUTION IN MICHIGAN
(IN THOUSANDS OF GALLONS)

	State	Saginaw Hinterland
Crude Production(1)	1,460,000	153,300
Refinery Capacity(2)	2,835,576	1,446,144
Indicated Crude Deficit	(1,375,576)	(1,292,844)
Estimated Refinery Runs(75% light prod.)	2,126,682	1,084,608
Consumption(3)	3,438,692	793,400
Indicated Products (Deficit)/Surplus	(4,312,010)	291,208
Estimated Capacity, Buckeye Pipeline	-	306,600

Note: (1) Michigan's Oil and Gas Fields, Michigan DNR Geological Survey Division, 1978. (Hinterland equals 10.5% of state production.)
(2) National Petroleum News Fact Book (Hinterland equals 51% of state capacity.)
(3) from Table IV-27.

SOURCE: TERA.

Most of the hinterland crude deficit is made up from Michigan production in adjoining counties. Most of the state deficit impacts Detroit area refineries, supplied by pipeline from other U.S. origins. Product availability in hinterland exceeds consumption.

Technology Analysis

Vessel Technology

There are compelling economies of scale in vessel construction and operation. Costs increase more-or-less linearly with the vessel length, but because of the three-dimensional shape of the vessel, capacity increases faster than costs. The result is lower unit costs - such as ton miles - with increased size. The ultimate in size is reached in the transoceanic movement of bulk cargos such as oil, where the largest tankers (ULCC's) have a deadweight or cargo carrying capacity of about 500,000 tons.

Because of lock constraints, the largest vessels operating within the Great Lakes are about 55-60,000 deadweight, the largest vessels operating between the Lakes and lower St. Lawrence (including Lake Ontario) are about 30,000 deadweight. All of these maximum-size Lake vessles are dry bulk carriers. Similarly, the largest ocean-going vessels serving the Lakes are principally bulk or neobulk carriers. These have deadweights in the 35-40,000 ton range, but they are limited to carrying about 23,000 tons into or out of the Lakes. Most of the ocean-going general cargo ships serving the Lakes are well under these maximum sizes.

By comparison, because of channel constraints - water depths and availability of turning basins - the largest vessels that can serve Bay City and Saginaw fully loaded approximate 20-25,000 and 12,500-12,500-15,000 ton deadweight tons, respectively. This indicates shippers using the Saginaw are at some cost or rate disadvantage because of channel limitations. Equally important, it raised the question of the continuing availability of smaller size vessels - and disproportionately higher rates for those vessels - in the future. The following table shows the composition of the Lakes fleet in size and age.

TABLE IV-33
1975 GREAT LAKES BULK FLEET PROFILE
(U.S. AND CANADIAN VESSELS)

Distribution by Size

Vessel Length (Feet)	No. Ships	% Total Ships	Capacity Long Tons	% Total Capacity	Avg. Capacity
Under 400	35	12.2	115,960	2.5	3,313
400-499	9	3.1	73,240	1.6	8,137
500-549	9	3.1	94,850	2.0	10,539
550-599	32	11.1	375,025	8.0	11,719
600-649	110	38.3	1,690,450	36.2	15,367
650-699	24	8.4	505,610	10.8	21,067
700-730	56	19.5	1,401,825	30.1	25,032
731-849	9	3.1	247,525	5.3	27,503
850-949	1	0.3	44,500	1.0	44,500
950-over	2	0.7	115,500	2.5	57,750
Totals	287	99.9	4,664,485	100.0	

Distribution by Age

	Age (Years)						
Length in Feet	55 and over	45 54	35 44	25 34	15 24	5 14	under 5
	Percent of Capacity						
Under 400	0.1	0.4	–	0.04	1.0	0.6	0.1
400-499	0.4	0.1	–	0.1	–	0.5	–
500-549	1.9	–	–	–	–	0.2	–
550-599	4.8	1.8	–	–	0.5	0.2	–
600-649	9.4	7.8	1.2	8.3	5.7	1.9	1.7
650-699	0.6	–	0.6	–	0.8	0.4	1.7
700-730	–	–	–	–	6.6	21.1	2.5
731-849	–	–	–	–	4.2	0.5	–
850-949	–	–	–	–	–	–	0.9
950-Over	–	–	–	–	–	–	2.4
Total Fleet	16.6	10.7	1.2	8.84	26.0	25.4	9.3

SOURCE: National Transportation Policy Study Commission Report, based on Greenwood's Guide to Great Lakes Shipping.

The vessel distributions show the impact of lock sizes, with the fleet concentrated around old Soo lock dimensions (600' to 650') and present Welland and Seaway lock sizes (700' to 730'), with new buildings sized to the new 1000' Sault St. Marie (Poe) locks. Trade publications verify that most new buildings and orders are for vessels in the large sizes, very few are for vessels under 20,000 deadweight. The following summarizes the information on future fleet trends provided by the Maritime Administration of U.S. Department of Commerce, and the Canadian Ministry of Transport.

Fleet Size. The total number of vessels currently serving the Lakes is not expected to change significantly in the next ten years.

- Based on past, present and projected deliveries of vessels from Great Lakes shipbuilders, the total fleet of dry bulk Lake vessels, U.S. and Canadian, is expected to increase from 250 in 1980, to 263 in 1990. The net increase in cargo tonnage is expected to reach 364,000 deadweight tons. This will result from increased shipbuilding after 1985, and the retirement of some of the oldest and least cost efficient smaller vessels now in operation. Although cargo vessels between 10,000 and 20,000, and 20,000 and 40,000 deadweight tons are expected to increase 9.4% and 9%, respectively, there is no expected change in Great Lakes cargo vessels with deadweight tonnages over 40,000 tons between now and 1990.

- The oceangoing fleet serving the lakes - bulk and general cargo vessels dedicated to the trade or calling repeatedly - is estimated to be 176 vessels now, and expected to decrease slightly to 172 in 1990. Similar to interlake vessels, the smaller, least cost-efficient oceangoing vessels are expected to decrease in number over the next 10 years, while the middle range, 10,000 to 20,000 deadweight tonners, and upper range, over 20,000 deadweight tons, are expected to increase 10.6% and 37.5%, respectively. This is based on the assumption that U.S. grain exports will remain good and that the automobile industry will recover by 1985.

Vessel Types. Because of the channel constraints on the Saginaw, the development of vessels that provide more economical transportation in smaller sizes would be especially welcome. Again, no significant changes are expected in the next ten years.

- Bulk carriers. In 1960, only two self unloaders were operating in the Great Lakes. By 1972, the number of self unloaders had risen to 21. Because of their larger dimensions, those 21 self unloaders represented 30% of the carrying capacity of the bulkier vessels on the Great Lakes.

  Because of the deteriorating cargo unloading facilities at the ports and the amount of labor and time required to unload cargo conventionally, it is certain that there will be far more self unloaders than straight deck cargo ships in the Great Lakes by 1990. When new cargo ship construction and self unloader conversions are taken into consideration, informed authorities agree that at

least 90% of the large Great Lakes cargo vessels will be self unloaders by the year 2000. It is questionable, however, if any of the new large vessels built for use in the Great Lakes will be involved in anything other than dedicated trade.

- Transoceanic vessels. According to 1979 statistics, oceangoing vessels provided 569 sailings between the Lakes and 39 overseas countries. These vessels tend to be both larger and smaller than the average in the world fleet. Some 8.1% of these vessels exceed 20,000 gross registered tons (only 1.4% of ocean vessels are that large), while 4.1% of them register less than 1,000 gross tons (only 0.9% of ocean vessels are that small). Approximately, 48% of these ocean going vessels are less than 10,000 gross registered tons. Although the size of general-purpose (general cargo) ships has stabilized, the trend is to move special-purpose ships that are preponderantly in the larger sizes. Because bulk cargos such as U.S. grain and coal continue to be in demand overseas, there is a concensus that direct Lakes-transoceanic service is assumed beyond the year 2000. The trend will be to larger vessel sizes.

- Feeder vessels. So-called "feeder services" are provided by smaller vessels that pick up cargo in the Lakes for trans-shipment of cargo to larger vessels at lower St. Lawrence ports. Their number is expected to increase, at least slightly, over the next 20 years. The use of Spanish-flag feeder vessels was discontinued several years ago and no new feeder service vessels have been constructed for the Great Lakes use. The two existing Great Lakes feeder service vessels, operated by the Manchester Lines, have proved to be profitable. Hence a U.S. company is currently undertaking the necessary procedures to begin Great Lakes feeder services for containerized cargo in the mid 1980s. Depending on the availability of capital, other shipping companies may be involved in similar enterprises in the future.

- Special vessel types. The trend toward special vessel types, such as shallow draft vessels, tug barges, and ice-strengthened vessels, will not significantly increase in the Great Lakes over the next 20 years. Indeed, for a variety of reasons specific to the different vessel types discussed below, the trend toward special vessel types will likely remain the same or even drop.

- Shallow draft vessels are not currently being built, or scheduled to be built, largely because: (1) they do not provide the desired economies of scale, and (2) the number and age of the shallow draft vessels currently operating on the Great Lakes adequately meet the demand for their service.
- Tug-barges, which are integrated power and cargo units with larger capacity than conventional barges, were thought to be an ideal alternative to more conventional bulk vessels which have larger crews and thus larger operating costs. Recent contract negotiations, however, between management and labor unions indicate that the labor unions will insist that tug-barge crews grow over the future. This growth in the number of crew members will detract from the trend towards tug-barges in the future.
- Ice strengthened vessels have not been well received in the Great Lakes, in spite of Coast Guard ice breaking activities. U.S. Steel has two, the James R. Barker and the Mesabi Miner, but restricts their service to dedicated trade. Other owners of ice strengthened vessels have been reluctant to risk the investments they have made in their vessels, apparently due to the damages their ice strengthened ships have sustained during the coldest months. Environmentalists are against ice strenthened vessels and threaten lawsuits which further discourage the use of ice strengthened vessels. Finally, industry is still accustomed to stockpiling their coal and paying the lower rates that non-ice strengthened vessels charge. Hence, the trend towards ice-strengthened vessels will probably not increase dramatically.

Fleet Forecast. A concensus forecast based on the preceding information sources is summarized in the following table.

TABLE IV-34
1980-90 GREAT LAKES FLEET PROFILE
(ALL FLAGS)

Vessel Type and Size	1980	1990
Ocean-going		
Under 10,000 dwt.	121	109
10,000 to 20,000 dwt.	47	52
Over 20,000 dwt.	8	11
Category Total	176	172
Lakes, dry bulk		
Under 10,000 dwt.	38	32
10,000 to 20,000 dwt.	117	128
20,000 to 40,000 dwt.	88	96
Over 40,000 dwt.	7	7
Category Total	250	263
Lakes, tank vessels		
barges	46	46
tankers	6	6
Category Total	52	52
Lake vessel Total	302	315
Total, all vessels	478	478

SOURCE: TERA

Facility Technology

Dry Bulk Materials. The Great Lakes has produced several innovations in vessel design, including icebreaking hull forms that have been refined further by Baltic shipbuilders, and self-unloading bulk carriers, a concept that is being more generally adopted now with coastwise and oceangoing ships. The self-unloading "Lakers," with convenyor booms of about 200 feet in length, were developed partly because of short travel distance and the need for quick port turnaround, and partly because of the inadequacy of port facilities. To a degree, these vessels have created their own need, because the availability of self unloaders has eliminated the need in most ports for sophisticated facilities to receive bulk cargo.

A significant impact of self-unloaders on port development has been the proliferation of minimal facilities to receive bulks, and the development of those facilities linearly along the waterfront within reach of the conveyor boom. There is no real harm from this if there is an unlimited amount of waterfront. Unfortunately, the cost of installing self-unloading equipment dictates that it is most economic on larger vessels, and the larger vessels require deeper channel depths. Where the channels require dredging, as in most lakeports, there is in effect, a transfer of facility cost to dredging cost.

The principal bulk commodities received at Saginaw ports are limestone, slag, cement clinker, sand and coal. For the foreseeable future, all except the last commodity are expected to arrive via self-unloading vessel, and minimal shoreside facilities will be required. Analysis indicates that in the distant future, the quantity of utility coal required may require use of maximum-size self-unloaders - particularly if

low-sulphur western coal is used. The discharge rate of these vessels is such that complementary high-speed transfer equipment is required for stockpiling. This, however, would be a proprietary utility facility. The receipt of bulk fertilizers, if developed at Saginaw ports, will likely involve non-self-unloading vessels. This can be handled by mobile cranes. Appropriate storage facilities would be the main requirement.

Sophisticated bulk handling facilities occur at loading ports, and those discharge ports that serve as transshipment points for volume movements, such as iron ore and grain. Only in connection with grain is there an indicated future need for such a facility on the Saginaw.

Grain. A number of factors are involved that dictate the minimum practical size for an export grain elevator:

- The facility must be able to load ships at an acceptable rate for vessel turnaround - typically 1000 tons or 35,000 bushels per hour minimum.
- The facility should have several loading spouts to avoid shifting the vessel, hence avoiding extra vessel expense and delays.
- The storage capacity has to exceed that of the largest vessel loaded, to provide reserve capacity and segregation of grains by grade prior to final mixing on loadout. (The largest Lakers used to move grain to the lower St. Lawrence carry about 1 million bushels. Direct loading "salties" load somewhat less - about 800,000 bushels.)
- Sampling and inspection facilities must be adequate to assure officials grades for grain loaded out.
- Receiving capacity, from rail cars and/or trucks should approximate loadout capacity to give flexibility in vessel scheduling, and good utilization of the facility.

- Most export elevators operate as do "terminal" elevators, receiving grain from other elevators. When export elevators also receive grain directly from farms, extra truck-dumping and grain drying capability must be provided. Accessional services for the producers - supplies and/or return loads - are desirable.

In brief, an export elevator is a sophisticated bulk terminal. The following table shows the operating parameters for Great Lakes elevators.

TABLE IV-35
CAPACITIES AT SELECTED GREAT LAKES ELEVATORS

Location	Channel Depth	Vessel Loading Speed(bu/hr.)	#Spouts	Storage Cap.(bu.)
Saginaw				
Farm Bureau	22'	35,000	3	2,150,000
Wickes	22'	25,000	1	2,250,000
Toledo				
Anderson	27'	45,000	7	2,000,000
Cargill	27'	32,000	10	1,800,000
Mid States	27'	45,000	12	5,500,000
Chicago				
Indiana Grain	27'	60,000	8	6,750,000
Cargill	27'	60,000	5	21,750,000
All Lakes				
Maximum	27'	94,000	8	21,750,000
Minimum	21'	10,000	1	1,300,000
Lower St. Lawrence				
Baie Cameau	40'	85,000	12	13,898,000
Three Rivers	35'	55,000	5	9,300,000

SOURCE: TERA, from Greenwood's Guide to Lakes Shipping.

It is estimated that a minimum new facility at Bay City would load out at 35,000 bushels per hour, and have a storage capacity of 1,500,000 bushels. At $5 per bushel of capacity, cost is estimated at $7,500,000.

General Cargo. Non-containerized cargo places minimal demands on the terminal facility - a secure berth, smooth apron, and some storage space for accumulating or distributing the "break-bulk" cargo. Typically this cargo is lifted on or off the vessel with the ship's equipment. The shoreside equipment consists of pallets and fork lift machines. Shore-based mobile or crawler cranes are used basically to supplement the ship's "gear," or expedite ship turnaround. Only with volume neo-bulk cargos such as steel or forest products does the nature of the cargo, or type of ship, dictate shore cranes.

In contrast, containerized cargo can produce expensive requirements for shoreside facilities. Because of the bulk of the truck trailer-sized marine containers, they are difficult to handle with ship's gear - if the vessel is so equipped. The usual solution at Great Lakes ports is the use of mobile or crawler cranes that are used primarily for the neo-bulk cargos. Absent these steel or forest product movements via Saginaw ports, the provision of cranes for containers only has been considered uneconomic. Containers produce a second problem in their movement and storage within the terminal area. Unless they are stacked two or more high, they use up more area than general cargo.

The ultimate solution for handling containers is special purpose and very expensive equipment - for both loading and unloading of vessels, and movement and stacking of containers in the terminal. Minimum investment in equipment installed, not including site and wharf structure, is about $5 million. The investment in many container terminals is for more than that, but when these terminals handle high volumes - 50,000 containers per berth per year and up - their unit costs (per ton) can be less than general cargo terminals. Labor costs, of course, are far lower.

Bay City must overcome two equipment problems if it is to regain general cargo business via containers.

- Marine equipment that is cost-effective in Great Lakes service, and
- terminal equipment that is both adequate and economic.

The cost of mobile or crawler cranes approximates $1000 per ton of capacity, and a 100 ton capacity crane (to provide 30-40 ton capability anywhere on the vessel) would be the likely minimum size.

Season Extension

A nine-year, multi-government agency effort generally called the "Season Extension Program" was concluded in mid-January, 1980. The purpose of the program was to keep the four upper Great Lakes open for all-year navigation, and to identify the related costs and benefits. The indicated net benefits were marginal, but the program did result in a significant and permanent increase in lock

operations and navigation season. The period of vessel and port operations in 1980 and subsequent years can be expected to exceed the 1958-70 average by about four weeks or 11%.

The final report of the Corps of Engineers on the Great Lakes and St. Lawrence Seaway Navigation Season Extension Feasibility Study was released in September, 1979, concurrent with the completion of the demonstration program. It concluded that

> "season extension is engineeringly and economically feasible year-round on the upper three Great Lakes, up to year-round on the St. Clair River-Lake St. Clair-Detroit River System and Lake Erie, and up to 10 months on Lake Ontario and the International Section of the St. Lawrence River."

Among its findings most relevant to Saginaw ports, it forecast a 36.6% increase in grain and related traffic. It did not forecast any increase in stone and related traffic at any port, because those commodities do not normally move via overland carriers in the off season. (Instead, carry-over inventories are built up during the navigation season.) It did not forecast any increase in chemicals and fuels for Saginaw ports although these do move by alternate modes - predominantly as in the case of fuels.

Based on a different methodology than the Corps', the Novey, Sarker and Hales study, Economic Benefits of

Extension of the Navigation Season to Twelve Months for Months for the Port of Bay County for the 1976-80 Period[4] predicted traffic increases for petroleum fuels and chemicals, as well as grains. This study also found no Saginaw increases for stone and related cargos and coal. Users of the Saginaw ports, and forecasts of season extension impact were based on questionnaire responses. The following table summarizes the Novey study forecasts of tonnage that would move with and without season extension:

TABLE IV-36
PERCENTAGE INCREASE IN SAGINAW TRAFFIC
ATTRIBUTABLE TO SEASON EXTENSION

Year	Chemicals	Petroleum Products	Agricultural Products
1976	39.1	25.8	63.3
1977	39.0	27.0	66.2
1978	38.8	28.3	69.1
1979	38.6	29.6	72.3
1980	38.8	31.1	75.5

SOURCE: TERA, from Novey, et.al.

The Novey study was appropriate in predicting increased traffic for more commodity categories than the Corps' study. The Corps' figure of 36.6% can be assumed as the minimum reduction of present port commerce attributable to navigation seasonality - or potential port traffic growth from season extension.

(4) Novey, op.cit.

Rate Analysis

Vessel Costs and Rates

In effect, all present traffic on the Saginaw is bulk commodities that are carried on contract rates. By definition, these contract rates are not generally available. Absent a representative sample of these rates and in order to avoid disclosure of proprietary information, this study analyzes the differential costs or rates attributable to vessel sizes and channel depths based on vessel operating cost estimates of the U. S. Maritime Administration that have been used in Corps of Engineer Great Lakes studies.

The Maritime Administration estimates are based on reproducing the present array of vessel sizes with new vessels. This inflates the capital cost element of derived rates, but has no significant effect on crew, fuel and other costs. In real life, many of the lake vessels are quite old - especially the smaller sizes - and were built at far lower prices, and may be depreciated to a nominal value. Accordingly, the constructed rates are likely to be higher than actual rates, depending on the capital cost assumptions of the vessel operators. By using reproduction cost, this study eliminates biases that could be introduced from assumptions as to the capital cost assumptions of the operators. There is a bias because the estimated rates have not been adjusted to reflect the age dispersion by size categories shown in Table IV-32. However, the differential in costs according to vessel size is representative. The following table summarizes the Maritime Administration estimates, adjusted for inflation to June, 1980.

TABLE IV-37
ESTIMATED OPERATING COSTS, GREAT LAKES BULK CARRIERS

Vessel					Daily Expense			
					Fuel[2]			
Class	Dwt.	Draft	Length	Cost[1]	At Sea	In Port	Cap. Cost[3]	Crew and Other[4]
II	9,050	21'2	450'	$16.0	$ 2,321	$ 536	$ 6,400	$ 8.927
III	11,750	21'7	500'	19.0	3,713	714	7,600	10,459
IV	14,100	22'4	560'	22.0	7,854	1,071	8,800	14,335
V	20,150	25'7	625'	27.0	8,568	1,250	10,800	15,279
VI	23,200	26'4	700'	30.0	9,639	1,428	12,000	16,453
VII	26,850	27'4	730'	34.0	10,103	1,428	13,600	17,020
VIII	32,000	28'6	806'	38.0	5,906	903	15,200	14,414
IX	44,500	27'10	858'	48.0	14,637	1,785	19,200	22,180
X	59,000	27'10	1,000'	59.0	14,637	1,785	23,600	23,025

Notes: (1) June, 1980 Cost in millions.
(2) June, 1980 Detroit bunker prices per bbl.: diesel - $35.70
#6 oil - 18.06
(3) Based on 10% leveraged lease financing, 250-day operating year.
(4) June, 1980 based on June, 1979 plus 7%

SOURCE: TERA, from U. S. Maritime Administration.

As shown in Table 37, the maximum size vessels that can serve Saginaw and Bay City now are Class IV and V, respectively. For estimated cost comparisons, this study has calculated costs for the following vessels and trades, based on present and possible future channel depths:

Trade	Vessels
Stone	IV, V, VI, VII
Grain	IV, V, VI, VII
Coal	V, VI, IX, X

The cost estimates require certain assumptions as to vessels (service speed rather than design speed), and loading/unloading rates. The two smallest sizes are assumed to be non self-unloaders, the three largest all self-unloaders or otherwise, appropriate to the trade. The assumptions are:

Vessel	Speed (mph)	Tons per Hour Loading	Tons per Hour Unloading
IV	13	2,000(1)	2,000
V	14	2,000(1)	2,000
VI	14	3,000(1)	3,000
VII	14	4,000(1)	4,000
IX	15	5,000	5,000
X	15	10,000	10,000

Note: (1) except grain, assumed to be 1,000 TPH

The estimated costs for representative commodity shipments to or from Bay City, based on the above information and assumptions, are shown in Table 38. Saginaw costs would be marginally higher.

TABLE IV-38
ESTIMATED VESSEL TRANSPORT COSTS TO/FROM SAGINAW PORTS
(Dollars per Ton)

Vessel Class	Vessel Dwt.	Stone Origins and Distance: Alpena (116 mi.)	Rogers City (157 mi.)	Escanaba (339 mi.)
IV	14,100	$ 2.78	$ 3.34	$ 5.92
V	20,150	2.32	2.74	4.60
VI	23,200	1.99	2.39	4.17
VII	26,850	1.84	2.21	3.86
		Grain Destinations and Distance: Baie Comeau (1242 mi.)	Montreal (839 mi.)	
IV	14,100	$ 19.14	$ 13.46	
V	20,150	14.46	10.34	
VI	23,200	13.86	9.92	
VII	26,850	12.80	9.17	
		Coal Origins and Distance: Toledo (278 mi.)	Sandusky (295 mi.)	Superior (625 mi.)
V	20,150	$ 3.98	$ 4.15	$ 7.53
VI	23,200	3.58	3.75	6.97
IX	44,500	2.67	2.79	5.10
X	59,000	2.01	2.11	4.02

SOURCE: TERA

Comparative Costs and Rates

The competitive rate position of Saginaw ports is especially important in regard to two commodity movements:

(1) Grain. To determine whether this existing movement is subject to diversion to other routings, and

whether investment in channel deepening and/or new facilities is justified.

(2) Coal. To determine whether this former movement can be recaptured, and to identify the rate, service, channel and/or facility improvements needed to do this.

Insofar as possible, actual quoted or tariff rates are used in this analysis.

Grain. Rates for vessels hauling grain between lakeports, or between lakeports are unregulated and unpublished, but are relatively stable. June, 1980 quotes, Lakes to lower St. Lawrence were as follows:

	Rates in Cents per Bushel	
Loading Port	25,000 ton vessel	12,500 ton
Toledo	27¢	34¢
Chicago	29¢	-
Saginaw	-	35¢

Ocean vessel rates vary widely with market conditions. Representative charter rates in May-June, 1980 were as follows: Quotes are dollars per long (2240#) ton, tons loaded in thousands shown in parenthesis.

Lakes Loading, St. Lawrence Completion

Loading Port(s)	Toledo		Lakehead	
Destination	Spain	Antwerp	Europe	Antwerp
Lakes Portion	(16) 39.00	(15) 44.50	(16) 33.50	(15) 32.50
St. Lawrence Portion	(13) 18.50	(15) 26.50	(9) 26.50	(9) 25.20

One Port Loading

Loading Port / Destination	Lakes Antwerp	St.Lawrence U.K.	St.Lawrence Spain	U.S. North Atlantic Spain	U.S. North Atlantic Continent
Rate	(15) 44.50	(32) 20.00	(35) 18.50	(25) 25.25	(20) 29.00

Relevant rates and their tariff references are as follows:

- Unit train: TEA 4043. Applications - item 370 rates - item 420. The required minimums are eight trains of 65 cars per year (50,960 tons at 98 tons per car). Each train must have single origin and destination - but same shipper can originate each train at different (specified) origin.
- Fallback rates: TEA 4038, item 7005. These rates apply if the shipper fails to reach unit train annual volume, still requires 10 car minimum per switch.
- Saginaw/Toledo rates: C&O 4300, item 800-B.

These rates are as follows, in dollars per short (2000#) ton, all current increases (x375 and x311B) included:

To	Car Owner	From Saginaw	From Toledo
Baltimore, unit train	carrier	$13.38	$11.69
(C&O/B&O)	shipper	11.09	9.47
Baltimore, fallback	carrier	17.64	
	shipper	16.02	
Philadelphia, unit train	carrier	13.90	
(Conrail)	shipper	11.62	
Norfolk, unit train	carrier	13.90	12.12
(C&O/N&W)	shipper	11.62	9.85
Toledo (C&O)			
single car, 190,000# min.	carrier	11.59	-
5-car, 475 ton min.	shipper	9.88	-
15-car, 1350 ton min.	shipper	8.74	-

The rate comparison for Saginaw grain routings are as follows: (short tons)

Via Baltimore Elevators	Unit Train	Fallback Rates
Rail rates, carrier cars	$13.38	$17.64
Elevation at Baltimore	1.25	1.25
Ocean Vessel to Europe(av.)	24.62	24.62
	$39.25	$43.51
Via St. Lawrence Elevators	12,500 tons	25,000 tons
Transshipment vessel	$12.50	$10.00
Elevation in Canada	2.14	2.14
Ocean Vessel to Europe(av.)	17.47	17.47
	$32.11	$29.61

Direct Export

Lake Port Loading (av.)	$33.92
One Port Loading (av.)	40.38

Coal. At the present time, the Consumers Power Karn-Weadock plants are supplied from Eastern Kentucky coal origins by C&O "unit" trains. The L&N also publishes similar train-load rates, but no coal is moving on them now. The Karn-Weadock plants also receive some coal ex-vessel, coincidental to Consumers' transportation arrangements for its Muskegan and Campbell plants. Hence rail water rates are also in effect to Essexville, but underutilized. These all-rail and rail-water rates are summarized below. Rates are in dollars per net (2000#) ton including current x375 and x311 B increases.

All-Rail

Trainload Minimum	Car Owner	Origins: East. Kentucky and W.Va. (C&O)	Origins: Hazard, Kentucky (L&N)
6,000 tons	carrier	$13.02	$15.13
	shipper	11.93	12.25
10,000 tons	carrier	-	14.88
	shipper	-	11.85

Rail-Water, Presently Used

Origin	Hazard, Kentucky	Crooksville, Ohio
Carrier	L&N	Conrail
Transshipment Port	Sandusky	Toledo
Rail Rate (1)	$ 9.53	$ 8.22
Transfer to Vessel	1.04	1.04
Est. Vessel Rate	4.15	3.98
Total	$14.72	$13.24

Note: (1) 6,000 ton trainloads, 500,000 tons per year minimum.

Rail-Water, Other Origins

Origin	Big Sandy, KY	Montana
Carrier	C&O	BN
Transshipment Port	Toledo	Superior
Rail Rate	$ 9.59	$ 17.00
Transfer to vessel	1.04	.40
Est. Vessel Rate	3.98	4.50
	$14.61	$ 21.90

Tariff references are: C&O - C04721-C.
L&N - SFA 4152-A. BN

Intermodal Rates

A number of Great Lakes studies have concluded that direct overseas general cargo services from the lakes are competitive in cost and service with alternate intermodal services via Canadian and other U.S. ports.[5/] Unfortunately, the number of regular, scheduled liner services continues to decline. The following list is a drastic reduction from the peak years after 1958. A number of Scandiavian, German, Dutch and Italian lines are gone. Some of these provided direct lakes service pre-war and pre-Seaway via the Lachine Canal.

1980 Great Lakes Overseas Services

Company	Route
Manchester Lines	United Kingdom
Yugoslav Line	Mediterranean
Lykes Lines	Mediterranean
Scindia Line	India
Shipping Corp. of India	India
Netumar Line	E.Coast, South America
Great Lakes Transcaribbean	Caribbean
Federal Commerce Atlantic	North Europe
Armada Line	North Europe

Historically, the lines serving the lakes would meet the U. S. North Atlantic port rates for the trade routes they served. With equalized rates and somewhat higher costs, the lines serving the lakes would then be selective in the

5/ Great Lakes - Overseas Marine Transportation and Market Assessment, Simat, Helliesen, Eichner, 1977. Great Lakes Traffic and Competition Study, Simat, et al, 1979. Great Lakes Cooperative Port Planning Study, PRC Harris, 1980.

merchandise carried; i.e., they would fill up with high-rated items such as machinery, if possible. With the steamship rates more-or-less equalized, the differential in overland shipping costs, again more-or-less related to distance, provided an incentive to shippers to use Great Lakes ports.

The present decline in service has been accompanied by a break in the traditional equalization of steamship rates. The shipping conferences that represented Lakes-overseas services have been disbanded, and most lines have cancelled their tariffs. As a result, rates are quoted direct by the line, on a query-by-query basis. A generalized estimate of comparative rates was provided by the Port of Cleveland: (Dollars per Ton)

	Lakes Direct	Canadian Gateway	N.Atlantic U.S. Ports
Overland Freight	$ 20	$ 20	$ 40
Steamship Rate	150	120	120
	$170	$ 140	$ 160

The "Canadian Gateway" estimate is based on the understanding that lines serving Montreal are meeting the North Atlantic ports' rates, and also absorbing the overland cost to the U. S. border point. In the case of a Lakeport that is also at a gateway, such as Detroit, this Canadian competition is intense.

Commodity Analyses and Forecasts

General Cargo

The 1968-77 average volume of general cargo traffic at Saginaw Ports was 38,254 short tons. The 1977 volume was 3,280 tons versus an estimated hinterland total of 67,024 tons.

It is estimated that long-run, 80% of the general cargo imports and exports will be containerized. The remaining 20% will be uncontainerizable because of weight or bulk, such as heavy machinery and project shipments. About half of the uncontainerized cargo will be routed through other ports because of flag preference requirements and existing transportation relationships. Of the containerized portion, about 30% are less-than-containerload quantities. These require consolidation or distribution at some container load center - possibly an inland container depot in the Detroit area, more likely at a container-port such as New York, Baltimore or Los Angeles. About half of the residual containerized traffic will also be pre-routed because of flag preference and existing relationships. As a percentage of the Saginaw Hinterland traffic, the Saginaw port potential is roughly 10% non-containerized and 28% containerized - a total of 38% if rates and service were competitive.

It is assumed that present Great Lakes break-bulk (non-containerized) services to Europe and the Mediteranean are competitive. Also to the Caribbean and East Coast South America, with limitations. It is also assumed that a minimum of $45,000 of freight revenues will be required to induce a call by one of these vessels at Bay City. It is further assumed that present Lakes "container" services are non-competitive but that long-run they will be:

to Europe via an express direct service, or alternatively to the Caribbean, Latin America, Europe and the Mediteranean, and Africa via a feedership service transhipping at Montreal or equivalent. It is also assumed that a minimum of $45,000 of freight revenues (current dollars) or about 15 containers per call, will be required to sustain container services.

The above indicates Lakes/ Far East and Mid-East services will never be competitive. That assumption results in a further contraction of port potential of about 17%, based on the Hinterland imports and exports shown in Table IV - 10 and 11.

Saginaw Hinterland General Cargo by Trade Route

	The Americas	Europe & Med	Far East Mid East	Africa	Total
Imports	0.6%	46.9%	8.8%	--	56.3%
Exports	6.5%	26.4%	8.2%	2.6%	43.7%
Total	7.1%	73.3%	17.0%	2.6%	100.0%

Applying the above percentages to the Hinterland general cargo forecasts adjusted for seasonal navigation (-36.6%) and non-competitiveness of Far East/Mid East services (-17%) give the following: (in short tons)

	Hinterland		Saginaw Ports	
Year	Total	Adjusted	Break Bulk	Container
1977	67,024	31,099	3110	(8708)
1980	77,734	36,069	3607	(10,099)
1990	112,715	52,300	5230	14,644
2000	161,688	75,023	7502	21,006
2020	296,168	137,422	13,742	38,478

In order to provide an acceptable level of service for shippers (at least fortnightly and preferably weekly), and a minimum volume of container tonnage to attract express or feedership service, the Saginaw ports would have to offer about 10,000 tons per year, spread over the 8.5 month navigation season. Potential containerized cargo is not projected to reach this minimum until 1990, hence the parenthesis shown above.

Chemicals

The 1968-77 average volume of chemical traffic at Saginaw ports was 187,170 tons. This combined average consisted of 131,673 tons of finished and semi-finished chemical materials, and 55,497 tons of hydrocarbon feedstocks. The 1977 actual volumes handled for the two categories were 83,931 and 65,877 tons respectively, a total of 149,808 tons.

It is assumed that actual shipments of chemicals are indicative of the present total Hinterland potential for Saginaw ports. No new major chemical complexes in the Hinterland are anticipated in the forecast period. Port traffic is expected to grow with expansion of the established industry. It is assumed that the chemical industry growth indexes for the Hinterland may be overstated because of air quality regulations that constrain Dow Chemical's growth now, and possibly in the distant future. Including identified new movements, and based on the above, the study forecasts are as follows, in short tons, rounded:

1977 - 150,000 actual
1980 - 225,000
1990 - 300,000
2000 - 430,000
2020 - 615,000

For comparison, annual shipments of some single plant complexes on the Gulf Coast are on the order of 350-500,000 tons.

Metals/Scrap

The 1968-77 average volume of unfinished metals and metal products (pigiron, pipe, etc.) and scrap at Saginaw Ports was 140,834 tons. Actual tonnage in 1977 was nil. In 1976 it was 2050 tons.

Large volumes of unfinished steel (coils and shapes) and scrap are still handled at some lake ports as, respectively, neo-bulk imports and bulk exports. Metal stamping activities (automobiles, appliances and related) use much of the steel and produce most of the scrap. The Saginaw Hinterland is not a center for such metal stamping activities. It does contain many automotive parts plants that use a relatively much smaller volume of sheet metal and a considerable amount of castings. Raw metal and scrap from domestic sources to feed these foundries are the only port traffic anticipated. The study assumes that the Hinterland potential is at least 10% of the ports' past average, and this will grow with "primary metal" manufacturing activities. This given the following forecasts: (in short tons)

1977 - 0 actual
1980 - 14,000
1990 - 16,380
2000 - 19,180
2020 - 25,620

Grains

The 1968-77 average volume of grain exports from Saginaw ports was 173,098 tons. The 1977 actual total was 207,059 tons. This compares with an estimated 2,342,300 tons of exportable grains produced in the Saginaw Hinterland that year.

Current grain exports via the Saginaw are only part of the hinterland production that is exported. A more cost-effective export facility could result in a larger share of the exports being exported via the port, and a larger share of the production being exported due to higher prices to producers. Based on the latter, the actual exports of hinterland production shown in Table IV-23 should approximate the national averages shown in Table IV-20. Assuming no extension in navigation season, this port potential would be reduced 36.6% for exports via tidewater ports as follows: (in thousands of bushels)

Year	Corn (63.4%x28.5%)	Wheat (63.4%x60.5%)	Soybeans (63.4%x44.5%)	Total
1977	12,244	6,640	2,370	21,254
1980	13,162	6,640	2,548	22,350
2000	19,743	6,640	3,821	30,204
2020	26,324	6,640	5,096	38,060

Based on the above, Saginaw grain exports with and without new facilities are estimated as follows: (in short tons)

Year	With	Without
1977	--	207,059*
1980	--	217,280*
1990	749,026	254,669*
2000	858,993*	292,058
2020	1,078,935*	366,838

*The forecast assumes new facilities and no channel constraints by the year 2000.

Feeds

In the 1968-77 period, feeds were exported in 1968 only-4069 tons. The sugar beet pellet export facility at Bay City became operational in 1979. It is assumed that the facility will be expanded or supplemented so that exports will reach their full potential by 2000, as follows: (in short tons)

1980 - 30,000
1990 - 50,000
2000 - 90,000
2020 - 90,000

Fertilizers

The 1968-77 average volume of fertilizers and fertilizer materials through Saginaw ports was 11,224 tons. The 1977 volume was 46,418 tons versus an estimated Hinterland consumption of 638,133 tons.

It has been assumed that with adequate facilities and promotional effort the Saginaw ports will be able to capture the movement of 25% of the Hinterland's fertilizer consumption by 2000. Based on the projections of Table IV-23, this gives the following forecasts: (in short tons)

Year	% Hinterland	Port Total	
1977	7.3	46,418	actual
1980	7.5	49,596	
1990	10	75,716	
2000	25	213,262	
2020	25	267,818	

Limestone

The 1968-77 average volume of limestone and stone substitutes (slag) at Saginaw ports was 2,018,592 tons. The 1977 volume was 2,184,792 tons. It has been assumed that actual stone shipments are indicative of the total Saginaw Hinterland potential, and that these will grow with the contract construction indexes shown in Table IV-26 as follows: (in short tons)

1980 - 2,056,908
1990 - 2,262,599
2000 - 2,468,290
2020 - 2,879,671

Cement/Cement Clinker

The 1968-77 average volume of cement and cement clinker through Saginaw ports was 206,462 tons. The 1977 actual tonnage was 231,325 tons. The 1977 total includes 81,271 of cement and 150,054 tons of clinker.

Shipments of both cement and cement clinker have been demand constrained. By converting the Aetna Cement plant from an integrated operation that started with the calcining of raw stone, to a grinding operation that starts with imported clinker, Lake Ontario has been able to operate the Aetna plan at levels well below those that would be economic for an intergrated operation. The forecasts require some assumption as to the continued viability of the Aetna plant, and whether its production will be superceeded by additional receipts of finished cement.

Accordingly, it has been assumed that the Aetna plant will be operated for grinding only, but at a 75% of capacity level to make it economic. This will inhibit but not completely eliminate the growth of cement receipts. It is assumed that Aetna must reach 75% of capacity by 1990, and Huron's cement receipts will grow at one-half the contract construction indexes in Table IV-26. This gives the following forecasts: (in short tons)

Year	Cement	Clinker	Combined
1980	80,000	250,000	330,000
1990	96,000	325,000	421,000
2000	100,000	350,000	450,000
2020	150,000	350,000	500,000

Sand

The 1968-77 average volume of sand through Saginaw ports was 440,583 tons. The 1977 total was 495,976 - all local traffic from Saginaw Bay dredging. Earlier years showed some external sand origins and destinations.

It is assumed that sand traffic will grow with the indexes derived in the economic analysis section. This gives the following forecasts: (in short tons)

1980 - 447,292
1990 - 478,602
2000 - 572,534
2020 - 773,815

Coal

The 1968-77 average volume of coal received at Saginaw ports was 669,614 tons. That approximates the 1972 actual volume. In prior years the volume was significantly higher. In later years it has been significantly lower, due to the present transportation of most Hinterland coal "all-rail".

It has been assumed in this forecast that the Consumers Power plants at Essexville will continue to receive their coal supply "all-rail" until plant expansion about 2020 significantly increases coal deliveries. (Use of maximum-sized lake coal carriers could possibly produce favorable rail-water rates now, but via Toledo and from coal origins not presently used by the Essexville plants). At that time, the estimated volume of coal will exceed the tolerance level at Bay City grade crossings, and the coal movement will return. It is also assumed that the present vessel deliveries of coal at Essexville will phase out in the 1980's as predicted by Consumers.

It is assumed that during the 1980's the movement of industrial coal through the port will be promoted, and this new enterprise will initiate movements of this coal about 1990. These vessel deliveries of industrial coal are assumed to be 25% of Hinterland consumption in 1990, and to plateau at 50% of consumption by 2000.

Based on the Hinterland coal consumption shown in Table IV-30, with industrial coal consumption assumed to be 10% of the "derived" figure, forecasted coal traffic is as follows: (in short tons)

Year	Utility	Industrial	Combined
1980	150,000	- 0 -	150,000
1990	- 0 -	23,322	23,322
2000	- 0 -	47,156	47,156
2020	8,910,288	200,036	9,110,324

Crude Oil

In the 1968-77 period, crude oil traffic on the Saginaw averaged 5463 tons per year, a mixture of relatively small shipments in and out. Similar to petroleum products, most crude oil movement into and out of the Saginaw Hinterland is by pipeline, supplemented by truck and rail transportation.

Similar to the cement/cement clinker forecasts earlier, the commodity forecasts require some assumption as to the future operation of the Dow Chemical refinery at Bay City. This is a relatively small but sophisticated refinery, 17,000 BPD capacity using light feedstocks and with catalytic cracking and alkalation capability. The refinery is now shut down as, at least temporarily, surplus to Dow's needs. Under the present refinery crude oil entitlements and allocation program, the refinery would be very attractive to an independent operator. This study has assumed that (1) so many small "topping" refineries have been built to take advantage of the allocation/entitlements program, the program must be changed, but (2) because so many of these refineries have been built, the program cannot be eliminated entirely. It is also assumed that operation of the refinery by an independent would be advantageous if (1) Dow had favorable access to petro-chemical feedstocks produced by the refinery, and (2) the refinery did not preempt any crude supplies needed by Dow.

Based on the above, it has been assumed that the refinery will be reactivated, to run principally on non-Michigan domestic

crude initially, and long-run on Canadian or other imported crudes. If long-run operation proves feasible, the refinery may be scaled up to more economic size, say 35,000 BPD. Initially it may run at less than design capacity. At least half the initial crude will be non-Michigan and non-pipeline. The imported crudes will arrive almost entirely by vessel.

The above produces the following forecast for crude receipts: (in short tons)

Year	Refinery Cap.(BPD)	Crude Used(TPD)	Annual Port Receipts
1980	17,000	- 0 -	- 0 -
1990	17,000	1308	235,350
2000	17,000	2615	470,700
2020	35,000	5385	969,300

Petroleum Products

The 1968-77 average volume of light petroleum products through the Saginaw ports was 229,190 tons. This consisted of 123,211 tons of gasoline, and 105,979 tons of distillates including jet fuels. In 1977, the total light product movement was 86,491 tons.

Most of the light product movement for the Saginaw Hinterland is accomodated in pipelines. Vessels are used only for a limited number or origins and destinations. The Buckeye pipeline is operating below capacity, and the Michigan Department of Energy forecasts only minor growth in light product consumption. According, it has been assumed that present light products movements will grow only 5% by 2000, 10% by 2020. This gives the following forecasts: (in short tons)

1980 - 80,000
1990 - 82,000
2000 - 84,000
2020 - 88,000

Residual Oils

The 1968-77 average tonnage of residual oil handled at Saginaw ports was 32,757. Traffic was principally outbound, with a variable amount of receipts. The Consumers Power #3 and 4 Karn plants currently use about 1,283,940 tons per year of residual oil, virtually all of it received by rail from Sarnia, Canada. (The coal-burning power plants also use some lighter oil for ignition). Unlike crude and light products, residual oil is rarely transported by pipeline. It is a good candidate for transportation by vessel.

This study has assumed that at least half of the Karm #3 and 4 residual oil requirements will be supplied by vessel by 1990. By that time Consumers' oil requirements will have declined as nuclear power becomes available. Eventually oil fuel will be phased out, by 2020 or sooner. This gives the following forecast for residual oil traffic: (in short tons)

1980	-	- 0 -
1990	-	641,970
2000	-	449,379
2020	-	- 0 -

Summary

A recap of the foregoing forecasts by commodity is as follows: (in short tons)

Commodity	1990	2000	2020
General Cargo	19,874	28,508	52,220
Chemicals	300,000	430,000	615,000
Metals/Scrap	16,380	19,180	25,620
Grains	254,669	858,993	1,078,935
Feeds	50,000	90,000	90,000
Fertilizers	75,716	213,262	267,818
Stone	2,262,599	2,468,290	2,879,671
Cement/Clinkers	421,000	450,000	500.000
Sand	478,602	572,534	773,815
Coal	23,322	47,156	9,110.324
Crude Oil	235,350	470,700	969,300
Light Products	82,000	84,000	88,000
Residual Oil	641,970	449,379	- 0 -
	4,861,482	6,182,002	16,449,703

Commercial Development Findings

The preceeding commodity forecasts, based on economic analysis of the Saginaw ports' hinterlands, predict a 50% increase in port commerce over current levels by 1990, a doubling of current commerce by the year 2000. At that time, port commerce will still be somewhat below its historic peak in 1965-66. The forecasts predict another doubling of port commerce between 2000 and 2020, based on return of utility coal movements to vessel deliveries. These forecasts were also premised on local initiative and promotion that would produce adequate channel depths and port facilities as needed so that the ports would achieve their full potential. The most significant development opportunities and needs identified by the forecasts are:

(1) Most opportunities for port traffic growth are in agricultural commodities - grain, pellets and fertilizers.

(2) The three agricultural commodies will require facility additions, with the biggest investment for grain, preferably in the Bay City area where there is a high probability of providing Seaway channel depths.

(3) Seaway channel depths would produce significant transportation savings, which would flow to the hinterland grain producers - on the order of $900,000 annually for present exports, over $4 million annually at the forecasted 2020 level of exports.

(4) Chemicals traffic will about double in the forecast period based on no new major chemical complexes in the hinterland and short and long-term constraints because of air quality requirements. Reactivation of Dow's Bay City refinery should be encouraged because it could produce a significant movement of crude oil and/or products.

(5) Energy materials forecasts are commodity specific. Coal receipts are expected to decline further, and then revive with a new industrial coal traffic that should be promoted and developed by entrepreneuers. Ultimately the utility coal movement is expected to return in very large quantities. Petroleum products are expected to grow only modestly, but there is an intermediate term opportunity for a substantial movement of residual oil (until displaced by coal).

(6) Construction materials - stone, sand (actually an industrial material) and cement and cement clinkers - are forecast to grow only modestly. However, because of the large volume of these shipments, additional channel depths would produce significant transportation savings. Based on $1.00 per ton, deepening benefits would be about $3 million annually in 2020.

(7) The forecasts indicate general cargo traffic will have the potential to be revived. Metals and scrap are other commodities that could move via a general cargo facility, and they are expected to move in modest volumes. The study did not identify any metallic and non-metallic ORES and minerals in future port traffic, but these low-volume movements such as refractory materials are also candidates to move via a general cargo facility.

This study's findings in regard to Commercial Development are summarized in three general categories:

- Facility Needs
- Land Use
- Port Promotion

Facility Needs

This section integrates the traffic forecasts with the facility inventory and estimates of the annual tonnage capacity of those facilities. Where applicable, the needs for additional facilities and/or deeper channels are identified, along with the estimated benefits of the latter.

General Cargo Facilities

Facility	Location	Berth(s)	Capacity
Dow/Seaway	Bangor	2 X 550'	100,000
Saginaw Valley	Bay City	1 X 350'	25,000
Oglebay/Surath	Carrollton	1 X 540'	40,000
	Total Estimated Capacity . . .		165,000
	2020 Estimated Traffic		77,840 (*)

(*) Includes General Cargo and Metals/Scrap.

There is no indicated need for additional general cargo facilities. The Dow/Seaway terminal is in the best location and with the least constraints. The other two facilities have channel and/or facility constraints. The Dow terminal has been inactive for three seasons. The Saginaw Valley terminal is active as a warehouse. The Oglebay terminal is being reactivated by Bernard Surath.

The Saginaw Valley terminal is functionally obsolete, but should not be rebuilt. As is, it may be able to handle specialty cargos such as newsprint or fertilizers. The Oglebay terminal is good industrial property, and Mr. Surath is in a position to develop metals and scrap traffic. The Dow facility would be good for container traffic if it can be developed. Seaway depths at the Dow terminal would enhance its potential, but there are no identifiable benefits at present.

Bulk Cargo/Proprietary Facilities. Twenty-six facilities handle cargo for the facility owners' account. They are analyzed in six categories.

Petroleum Products

Facility	Location	Berth(s)	Capacity
Union Oil	Bangor	--	--
Amoco Oil	Bangor	1 X 392'	150,000
Total/Leonard	Bangor	1 X 382'	150,000
Enterprise Oil	Essexville	1 X 270'	150,000
Peerless Refin'g	Carrollton	1 X 500'	150,000
	Total Estimated Capacity . . .		600,000
	2020 Estimated Traffic		88,000

Although there are not many light products terminals, their number is still excessive. Because of the geographical dispersion, only the Bangor piers are candidates for consolidation. One good pier there would suffice, particularly if oil company lines were also interconnected with a petrochemical berth to handle possible simultaneous arrivals of products carriers.

Because of the tank vessels used in the products trade, there would be no indicated benefits from deeper water at Bangor/Essexville, and no identifiable benefits for the Carrollton terminal.

Chemicals, Petrochemicals, Crude

Facility	Location	Berth(s)	Capacity
Bay Refining	Bangor	1 X 350'	300,000
Int'l. Terminals	Bangor	1 X 235'	300,000
	Total Estimated Capacity . . .		600,000
	2020 Estimated Traffic		1,584,300

The Bay Refining and International Terminals berths have a combined capacity to handle anticipated petrochemicals traffic (615,000 tons). If the refinery receives its crude requirements via vessel instead of the present 20-inch Canadian pipeline connection, two additional berths may be needed.

Seaway water depths would be desirable, but there are no identifiable benefits at this time.

Stone and Industrial Coal

Facility	Location	Berth(s)	Capacity
Carrollton	Essexville	800'	160,000
Sand & Stone	Essexville	1400'	280,000
J. Wirt	Bay City	1500'	300,000
R. Gage	Bay City	560'	112,000
Rock Prod.	Bay City	470'	94,000
Midland	Bay City	970'	194,000
Anderson	Zilwaukee	1100'	220,000
Consumers	Zilwaukee	1115'	223,000
Saginaw Asph.	Buena Vista	1050'	210,000
Wirt Saginaw	Buena Vista	1800'	360,000
Saginaw Asph.	Carrollton	964'	184,000
Saginaw Sand	Carrollton	965'	193,000
R. Gage	Saginaw	1000'	200,000
Rock Products	Saginaw	1050'	210,000
	Total Estimated Capacity . . .		2,940,000
	2020 Estimated Traffic		3,079,707

Capacity has been estimated at 200 tons per foot of berth per year. This is based on stockpiles paralleling the waterfront, with the capacity constraint being the delivery

out of storage, not the delivery capacity into storage by self unloading vessels. This is an extravagant use of waterfront - but the cost of land versus the cost of machinery to stockpile away from the waterfront indicates stone "docks" will follow the present pattern. The 14,704 feet of waterfront now used equals 24.5 berths 600' long. Industrial coal has been included with stone because it anticipated it will be handled the same way as stone, and possibly by the same terminal operators.

The present average throughput rate for all Saginaw stone docks is about 135 tons per foot of berth. Some terminals are at or above the 200 tons per foot throughput rate, since others have severe capacity contraints. Allowing for these constraints and an average 170 tons per foot of berth per year (roughly the mid-point between the present average and theoretical maximum) would produce a requirement for 18,116 lineal feet of stone and coal "docks" in 2020, or an indicated need for 3412 additional feet of facility.

Because self unloaders are predominantly larger sized vessels, there would be identifiable benefits from deeper channels. A 26' channel depth would permit stone deliveries by vessels up to 700 feet long and 24,000 tons deadweight. This would provide estimated benefits of 33¢ to 43¢ and 79¢ to $1.75 per ton for stone delivered to Bay City and Saginaw, respectively, from present origins, and about 40¢ and $1.42 respectively, for coal from Lake Erie loading ports.

Cement/Cement Clinkers

Facility	Location	Berth(s)	Capacity
Aetna	Essexville	850'	340,000
Huron	Carrollton	545'	218,000
	Total Estimated Capacity		558,000
	2020 Estimated Traffic		500,000

Capacity estimates are based on 400 tons per berth foot, reflecting different stockpiling patterns and more intensive throughput. The present capacity appears adequate.

Huron's facility constraints match the channel contraints at Carrollton, and there are no identifiable benefits from channel deepening. Aetna's plant would benefit from full Seaway/Welland Canal depths. The additional foot of depth would produce estimated transportation savings of $100 per ton.

Utility Fuels

Facility	Location	Berth(s)	Capacity
Consumers	Hampton	2664'	2,664,000
	2020 Estimated Traffic		8,910,288

Consumers' present wharf and coal handling system were adequate to handle over 2 million tons per year in the past. When the anticipated large volume of coal materializes due to plant expansion, a significant improvement in onshore coal handling equipment will be required but the bulkhead would be adequate. In the interim, the bulkhead would be adequate for the interim movement of up to 642,000 tons per year of residual oil.

The benefits from transportation of 2020 coal requirements in 1000' Lake vessels is estimated at $2.00 per ton.

This will require deepening of the Bay and River Entrance channels to 28', and a new turning basin. In the interim, the site for a 1000' by 2000' basin should be reserved.

Industrial Plants

Facility	Location	Berth(s)	Capacity
AmHoist/ Brownhoist	Bay City	365'	--
Chevrolet Nodular Iron	Saginaw	2343'	702,900
Chevrolet Grey Iron	Saginaw	1500'	450,000
	Total Estimated Capacity		1,152,900
	2020 Estimated Traffic		773,815

The Brownhoist berth at Bay City is used occasionally for heavy lift shipments. Although used only sporadically, this alternative transportation is advantageous to the plant and the facility should be preserved.

The Chevrolet downstream berth at Saginaw (Nodular Iron Castings Plant) is used only for sand receipts now. In the past, it and the upstream berth at the Grey Iron Castings Plant were also used for receiving stone, coal, pig iron, scrap and ferro alloys. Capacity is estimated at 300 tons per foot of berth per year because materials move off the wharf for plant use more promptly than at stone "docks".

The downstream wharf appears adequate for the projected sand movement. The present underutilization of both wharves and projected underutilization of the upstream wharf could be used as an opportunity to revive industrial coal traffic.

The present sand movement is by a relatively small dredge, the Niagara, 257' long with a draft of 20 feet. There are no present benefits from channel deepening at these piers.

Neobulk Cargo/Multi-User Facilities. There are a limited number of bulk terminals that operate as "public" facilities for use by shippers other than the facility owner. All five serve the agricultural sector. They are analyzed in three categories.

Fertilizers and Molasses

Facility	Location	Berth(s)	Capacity
Fletcher (Molasses)	Bay City	1 X 188'	150,000
Fletcher (Fertilizer)	Bay City	1 X 220'	150,000
Agrico	Saginaw	--	--
	Total Estimated Capacity . . .		300,000
	2020 Estimated Traffic		267,818

Estimated capacity does not equate with estimated traffic as shown. The Fletcher fertilizer terminal handles only liquid fertilizers. The forecast anticipates most of the fertilizer movement will be dry bulk materials. The Fletcher molasses terminal (Industrial Molasses/Westway Trading) has been inactive because a suitable vessel has not been available. The forecast did not include molasses for this reason.

The Agrico warehouse at Saginaw is a proprietary facility that serves a statewide market. Since it is near but not adjacent to the waterfront, it is possible that use of the R. Gage waterfront can be arranged. This study assumes it

will be, and that the Agrico plant could handle up to 150,000 tons annually. That would leave an indicated facility need for a facility to handle about 150,000 tons per year. One solution would be redevelopment of the Fletcher waterfront to handle dry bulks in combination with the liquid fertilizers. Alternately, this could be a separate facility, preferably in the Bay City area.

Based on a mix of Lake and River/Lake vessels expected to transport the fertilizers, there are no identifiable benefits from channel deepening.

Feeds

Facility	Location	Berth(s)	Capacity
Wirt Terminal	Essexville	350'	30,000
	2020 Estimated Traffic		90,000

The coincidence of the sugar beet processing season and the seasonal close of Lakes navigation requires a relatively large amount of storage capacity in relation to annual throughput for a sugar beet meal pellet export facility. There is an indicated need to expand the Wirt terminal's storage and handling capacity. Alternately, the facility needs could be met with an additional facility at Bay City. The expansion and/or additional facility will more than double space and berth requirements.

Because of the nature of the pellets, they are almost always exported direct, rather than transshipped as grain is. Regardless of the vessels used for the pellet exports, there is some penalty due to the 25' channel depth at Essexville. The smaller vessels for whom that depth is not a constraint, normally charter for higher per ton rates reflecting size diseconomies. The larger vessels that cannot load full at

Essexville, must "top off" at other Lakes ports or at the lower St. Lawrence. Their rates for Saginaw cargos will be differentially higher. The estimated benefits of full Seaway depths at the Essexville pellet terminal(s) are $1.00 per ton.

Grain Elevators

Facility	Location	Berth(s)	Capacity
Farm Bureau	Zilwaukee	556'	642,857
Wickes	Carrollton	598'	928,571
	Total Estimated Capacity.....		1,571,428
	2020 Estimated Traffic(all grain)		2,586,514
	2020 Estimated Traffic(exports)..		1,078,935

Elevator capacity is determined by the storage and handling capacity of the facility and the number of times the grain "turns" in a year. "Turns" will depend on whether the elevator is used principally for storage or transfer. For example, farm storage typically turns once a year. Country elevators will turn 3 to 5 times per year. Terminal elevators will turn 5 to 10 times per year. Export elevators may turn 20 times per year. The Farm Bureau elevator has a capacity of 2.25 million bushels. The Wickes elevator is being expanded to 3.25 million bushels. Annual throughput capacity for these two elevators is estimated based on 10 turns per year, 35 bushels per ton average for mixed grains.

Based on Table IV-23, the Saginaw area waterfront elevators have a capacity for and handle about half of the hinterland's off-farm grain sales--domestic, direct and indirect exports. To maintain this market share in 2020, capacity would have to be expanded 82.5%, to a total of almost 10 million bushels.

Based on the need for additional elevator capacity, the assumption that part of it will be built as a "deepwater" elevator, and the grain export potentials shown on page 122,

indicated elevator capacities are as follows: (thousands of bushels, 35 bushels per ton)

Year	Market Share	Elevator Capacity Needed	Exports Via Elevators At Saginaw	Exports Via Elevators At New	New Export Elevator Capacity
1980	49,591	5,500*	7,605	--	--
1990	59,825	5,983	8,913	17,302	1,730
2000	70,059	7,006	10,222	19,843	1,984
2020	90,528	9,053	12,839	24,923	2,492

*Actual

Because of the better prospects for seaway depths at Bay City, it would be desirable to build all or part of the needed elevator capacity there. To avoid traffic congestion of downtown Bay City, the indicated location is on the west bank or north shore of the river. The west bank/north shore location would also provide direct connection with the Saginaw elevators by Conrail/GTW, wo that the Bay City elevator could operate as an export sattelite facility for the existing elevators.

The benefits of Seaway depths and direct export of grains are estimated to be $4.00 to $4.55 per ton.

Special Facilities. As noted earlier, small craft facilities for recreational craft are addressed elsewher in this report. There was no identified need for commercial fishing vessel facilities.

A recent study performed for the U.S. Maritime Administration examined the feasibility of trans-lake ferry services on Lake Ontario (Rochester-Toronto), Lake Erie (Cleveland-Port Stanley) and Lake Huron (Bay City/Saginaw-Georgian Bay).

The Lake Ontario service appeared to be feasible, and the other two not, based on estimated traffic potential.

If and when the traffic potential grows to justify the Lake Huron ferry service, it is likely to be a "roll-on, roll-off" service, rather than the alternative container service analyzed in the MarAd report. The container version would provide additional justification for container equipment at a Bay City general cargo terminal. The more likely "roll-on, roll-off" version will require modest facilities within the capability of a port authority, and might be integrated into the general cargo terminal.

Land Use

This section summarizes the identified facility needs including opportunities for consolidation and expansion, in order to identify commercial waterfront land needs and provide a basis for integration with recreational land needs and determining priorities. Table IV - 3 summarizes the present and projected commercial waterfront usage.

Table IV-39

WATERFRONT OCCUPANCY BY COMMERCIAL FACILITIES, 1980 & 2020
(WATERFRONTAGE IN FEET)

Type	Berths		Waterfrontage	
Facility	1980	2020	1980	2020
General Cargo	4	2	1990	1100
Metals/Scrap	--	1	--	540
Petroleum	4	3	1544	1270
Chemicals	2	4	585	2000
Stone/Coal	24	30	14704	18000
Cement/Clinkers	2	2	1395	1395
Utility	4	2	2664	2664
Industrial	2	3	4208	4208
Fertilizers	2	4	408	1000
Feeds	1	2	350	1200
Grain	2	3	1154	2190
Special	--	--	--	--
TOTAL	47	56	29,002	35,567

Excluding the Consumers Power facility at the river entrance, the waterfront occupancies for 1980 and estimated 2020 are 26,338 and 32,903 feet respectively. The waterfrontage on the Saginaw between the commercial facilities farthest downstream except for Consumers (Amoco and Aetna) and the Grand Trunk Western bridge in Bay City, is about 29,500 feet. Excluding the 4208 feet of industrial facilities, it appears theoretically possible to relocate all other marine terminals along the 2.5 mile reach of the river where maintenance and deepening would be most feasible.

In practice, such saturation use of the waterfront does not happen. Even on an intensively developed waterfront such as portions of the Houston Ship Channel where piers are continuous, vessel movements and other factors require about 50% more space than the vessels actually occupy. At 150% of the estimated frontage needed for the Saginaw the 2020 requirement would be 43,042 feet exclusive of Consumers and the industrial frontages. Even if the presently undeveloped 10,000 feet of frontage near the river mouth were included, the riverfrontage downstream of the GTW bridge would be insufficient.

The findings of this section are:

(1) It is not feasible to consolidate all marine terminals on the Saginaw at Bay City.

(2) The undeveloped mile of river near the mouth will not change the feasibility of consolidating all marine terminals at deep water. Accordingly, use of this waterfrontage for recreational development would be equally appropriate. As an area that would be especially attractive to recreational boaters, and as a way to keep small craft out of the marine terminals area, (and minimize bridge openings upstream) the recreational use of this area would be preferred.

(3) The 2.5 mile reach of the river from Bangor/Essexville to the GTW bridge should be used as intensively as possible for marine terminals. Recreational facilities should be limited to passive facilities with minimal waterfrontage. Viewpoints to view commercial activities are desirable.

(4) The waterfront facilities along the river nearest Saginaw have the best potential for industrial sites rather than marine terminals.

The areas recommended for marine terminal development and water-related industrial development are shown on Figure IV-3 following.

Commercial Development Plan

As in most ports of the world, the Saginaw combines some underutilized facilities with a need for some new facilities. The solution is local initiative, as it is in addressing the needs of the Federal Port Project. The conventional approach to both solutions in most ports is a formal port organization. The State of Michigan's Port Authority Act of 1978 encourages the creation of such an organization. Regardless of the form of the organization, it should be structured to provide continuity of effort in port development programs.

The priority order of commercial port development efforts is to promote the use of underutilized facilities through new traffic or new uses, and a longer term effort to provide the new facilities needed. Neither requires a massive infusion of public funds. Historically, the facilities on the Saginaw have been provided and operated by private enterprise. By definition however, there is a need for additional promotional effort.

Historically, the promotional efforts of private enterprise have centered on the facilities or services in which the enterprise had a proprietary interest. In small ports such as the Saginaw, the narrow range of services offered by each enterprise limit the return on promotional investment. In many cases, there is none (effort). A promotional effort in behalf of all the facilities and services has a higher probability of success. The best solution combines this with the incentive of proprietary interest.

This report proposes one activity for a new port organization that would meet many of these conditions: the reactivation of the Dow Chemical-owned Bay City Seaway Terminal. The commodity analysis identified only 3607 tons of potential 1980 general cargo for this facility. A necessary caveat is that rebuilding the port's general cargo traffic may be the single most difficult task for a port organization. On the other hand, if the port had no general cargo facilities, it could never get any. If the Saginaw had no general cargo facilities now, there would not be justification in building one. It does have three, and of these the Dow facility is the best one. The forecasts indicate that by 1990 there will be a volume of general cargo and metals and scrap, 36,254 tons, that could make it a viable operation.

There is compelling logic in preserving and promoting this facility for future general cargo use. Because the Saginaw is centrally located to serve Michigan's Lower Peninsula, it has in the past been a general cargo port of some consequence - for Lakes package freight and overseas general cargo. The Lakes package freight business succumbed to truck transportation as highways were improved. World War II ended the last of these services. The overseas general cargo traffic has succumbed to "containerization". Since Oglebay Norton Co. ceased operation of the Dow Chemical-owned Bay City Seaway Terminal in 1976, there has been no general cargo traffic.

The port has been adversely affected by general cargo diversions to other routings because of containerization and related rate and service factors. The prognosis for general cargo traffic is poor. But there are reasons why this traffic should not be written off now and for all time. The port does have a good general cargo facility in the Dow terminal. Present channel dimensions are adequate for this traffic, and could be brought to Seaway standards. And the port's location is an asset to be utilized.

In view of the fact that the Great Lakes states produce a major part of the U.S.'s imports and exports, the low participation of Great Lakes ports in this trade has always been a disappointment. This relatively low participation is due principally to disproportionately high vessel operating costs for overseas vessels in the Lakes. These reflect:

- Size constraints-due to locks and channels sizes. More larger, more efficient vessels can serve Tidewater ports than Lakes ports.
- System constraints-costs due to slow travel and higher manpower due to lockages and constricted channels. Also, circuitous routings via the Lakes to certain ports.
- Low utilization-due to system constraints and seasonality.

Although intralake vessels achieve a high degree of utilization during their operating season, the same level of precision in scheduling has never been achieved by the "salties" serving the Lakes. As a result, the operators of many ocean-going vessels that could serve the Lakes have preferred to use them on transoceanic runs where profitability, not necessarily higher, is more predictable. Some of the operators who have put ocean vessels into the Lakes have done so with obsolete vessels --a guaranteed disaster when the problem is high operating costs.

The generally accepted solutions to vessel profitability in Lakes general cargo trade--other than giving up--are:

- Purpose built vessels, maximum Seaway size, to handle bulks or neobulks (autos and/or steel in, grain out) and incidentally containers on deck or in one or two hatches. This is the successful solution used by Federal Commerce to Lakes ports, Cast Line to Montreal.

- Purpose built, medium-size container vessels to give express service from a few Lakes ports on the most cost-effective overseas run--Transatlantic to North Europe, with transshipment beyond. Great Lakes European Line intended to give this service, but never reached target with equipment or service.

- Feederships, purpose-built or imported from other runs, to connect Lakes ports with a transshipment point such as Montreal, for direct service from there to overseas destinations. Manchester Liners provides a limited version of this, with some service limitations due to ownership.

The first two solutions restrict Lakes service to load-center ports such as Detroit, Chicago, Cleveland, Toledo. In practice, the feedership concept has worked the same way. In theory, some versions including tug-barge feedership operations would be more flexible.

Potential uses of the Bay City Seaway Terminal would be:

(1) Containers--if and when a cost-effective feeder service is developed.

(2) Project shipments--such as American Hoist/Brownhoist movements of oversize equipment.

(3) Small-volume bulk cargos--sporadic shipments of fire clay, pig iron, minerals or metals, that move in single shipments of a size that justifies a call by the vessels (Lake and overseas) now serving the Lakes, for which a general cargo pier is suitable and public berth is needed.

The existing channel widths and depths would be adequate for the above traffic at the Bay City Seaway Terminal:

(1) Feederships would be less than the Seaway maximum (25' draft, 27' depth).

(2) Project vessels may go up to Seaway maximum, but most heavy-lift vessels are smaller.

(3) Small-volume bulks would be carried by a variety of vessels, but most likely those of Russian, Polish and Yugoslav flag which are under Seaway maximum size. The U.S. flag Lykes Lines vessels, if and when they serve the Lakes, could exceed the Saginaw's limits--but they are unlikely to carry neobulks.

One approach to doing this would be for the new port organization to lease the facility from Dow Chemical, and to promote its use. Specifically:

(1) Lease the facility subject to Dow's needs, for a reasonable but not nominal sum--say, one-half of all wharfage earnings against a minimum of $10,000 per year. This will offset Dow's maintenance expense, and/or additional maintenance due to facility use.

(2) Fund a basic port authority staff to administer and promote use of the facility, one person with or without assistant--say $50,000 per year, half salary, half overhead and promotional expenses.

(3) Under the Michigan Port Authority Act, one-half the above operating expense would be recoverable from the state. This would leave $30,000 per year, hopefully shared equally by Bay, Saginaw and Midland counties.

(4) At a conservative level of 40¢ per ton wharfage--and possibly dockage--charges, 25,000 tons of cargo would produce the $10,000 minimum terminal rental, and reduce the contributions of the state and three counties.

(5) The return on investment by the three counties would be increased employment, possibly on the order of

> $4 per ton of cargo handled. In addition, the port authority staff could help represent the interests of all users of the Saginaw in matters such as liaison with the Corps on channel matters. Channel improvement could produce additional business at these other terminals and/or cost savings for receivers and higher returns for shippers.

The above concept implies that when personnel or equipment are needed for handling general cargo, they would be contracted for. In this connection, it must be recognized that as general cargo volume declined, and absent an inbound neobulk movement of steel such as at Detroit, Oglebay Norton ceased operation of the terminal because there wasn't an economic volume of business for the equipment required. The port authority will have to be selective in the cargo it promotes, and will have to address the equipment problem in a timely manner.

Timeliness is also important in the creation of the port organization. The dredged material disposal and other Federal Project problems that this agency would address, require attention now. The sooner port development efforts are started, the more effective they will be. The port organization should be created promptly.

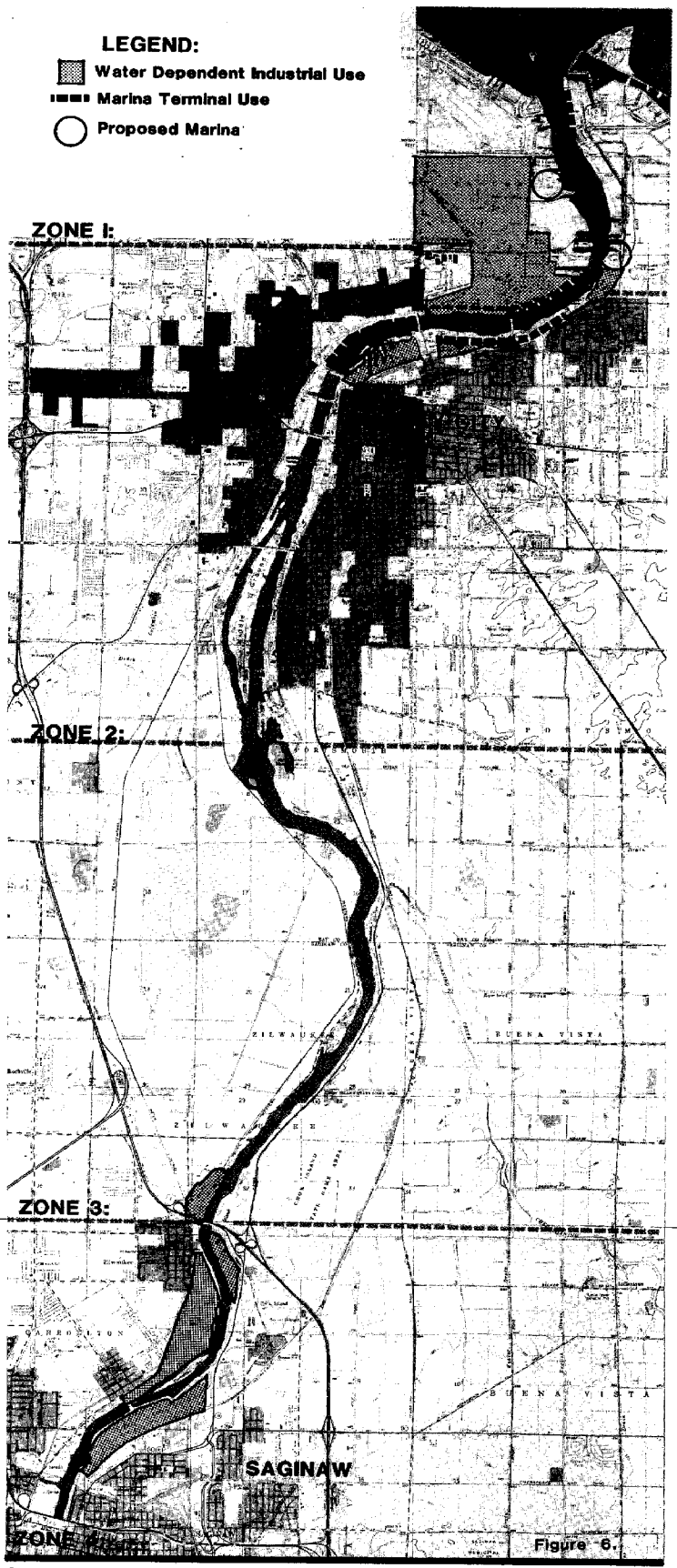


Figure 6.

Saginaw River Port Development Study

Commercial Plan

Transportation and Economic Research Associates, Inc.

Johnson, Johnson & Roy/inc.

V. Recreational Development

Overview

The Saganaw River is one of the key natural assets of Bay and Saginaw Counties. As a transportation artery it was a key factor in the location and growth of the urban centers of Bay City and Saginaw. Formed by the confluence of four rivers and stretching twenty-two miles in length, the river is of considerable commercial and recreational importance, not only to the two counties but also to the adjoining region, the State of Michigan, and the United States as well.

Most of the twenty-two miles of the Saginaw River shoreline is currently utilized. Regional population growth and rising energy costs will further increase the importance of the commercial waterway and recreation opportunities that the Saginaw River offers. For these reasons, it has become ever more important to efficiently utilize the resources offered by the Saginaw River while at the same time protecting their long term values.

The Saginaw River passes through several political subdivisions including Bay and Saginaw Counties, the cities of Saginaw, Bay City, Essexville, Zilwaukee and Carrollton, in addition to the townships of Bangor, Buena Vista, Carrollton, Frankenlust, Zilwaukee, Hampton and Portsmouth. Each political entity has considered the resource use and potential of those portions of the Saginaw River which passes through its own jurisdiction. The purpose of this study is to evaluate the current usage of the river, its opportunities and potentials, and to plan for its effective use as a single unified resource. This component of the study addresses the recreational use of the river and its interrelationship with the other uses of the Saginaw River and shoreline.

Study Methodology

The recreational analysis follows several steps; 1) The study first reviews the existing uses of the riverfront. 2) The study then identifies existing recreational facilities and potential recreation opportunities along the riverfront. 3) The study proceeds to analyze the demand for recreational usage along the Saginaw River Corridor. 4) The condition and usage of existing facilities is evaluated and compared to the assessment of recreational need. The resulting deficiencies are analyzed and a long range recreation framework plan is developed. The long range recreation framework plan provides guidance for local communities, counties and the State as to what facilities and opportunities should be developed to provide for the long range recreational needs of the citizenry at large. The process followed in developing the long range framework plan is discussed in detail below.

- Data Collection and Site Visitation. Adopted land use plans and existing recreation plans for each of the political entities was obtained and reviewed. The river corridor was surveyed and data was compiled during several site visits. Information was accumulated by boating along the 22 mile length of the river, and by driving through and flying over the entire study area. A slide inventory of the recreational facilities along the river edge was compiled. Numerous interviews were conducted with Township, City, County and Regional officials, as well as private operators of marina facilities.

- Recreation Demand Analysis. Current demand was established for recreation facilities within the study area, followed by a determination of recreation deficiencies. Existing and future demand for recreation activities was established from the review of existing conditions information gathered during site visits, and from interview sources.

- Riverfront Analysis. Analysis of research information provided the basis for identifying the problems and opportunities for recreational facilities found along the river corridor. An assessment was conducted of

lands presently used for recreation facilities, those proposed for future use, as well as other properties which offer recreation potential.

- Preliminary Framework Plan. Existing and future recreation land uses were assessed in light of satisfying the commercial and industrial needs along the river corridor. Potential conflicts between uses were evaluated. Recommendations were prepared in the development of a framework plan. Improvement and expansion plans for existing facilities were suggested, followed by recommendations for currently proposed facilities. The recommendations also include new use opportunities along the riverfront.

- Plan Review and Final Documentation. A review of the preliminary framework plan by the project committee was undertaken and discussion led to revisions in the development of a final plan. Information gathered during the review stage was incorporated into framework plan and the final plan was documented and published.

Land Usage

Study Area

The specific concern of this study, and therefore the principal area of focus, is the Saginaw River and its adjacent land uses. Beginning with the river's mouth at Saginaw Bay, the navigatible portions of the river generally define the study boundaries. Land areas found approximately 1,000 feet either side of the river have been considered as outer limits of the study area. Commercial navigation terminates in the northern portion of the City of Saginaw, at the Sixth Street bridge crossing. Small recreation craft do travel south of this point. The southern boundary of the study area is considered to be the turning basin north of the 6th Street bridge. Because significant riverfront recreation areas are found south of this bridge, the recreation analysis reviewed opportunities extending to the Southern limits of the City of Saginaw. See Figure V-1.

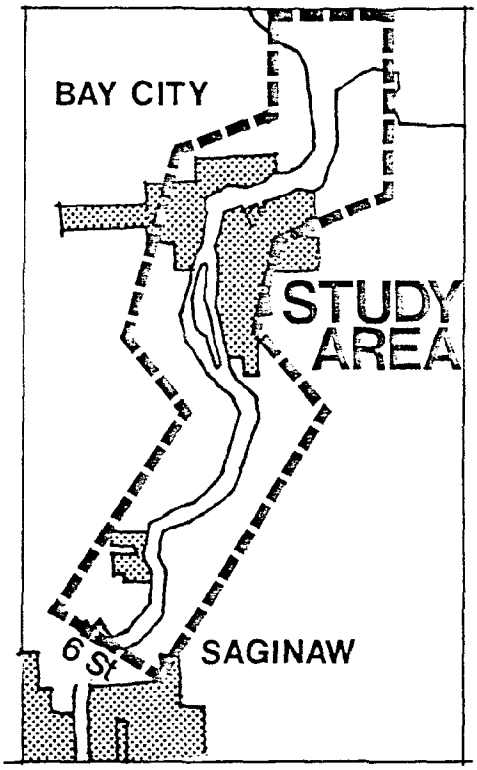


Figure V-I

While the river corridor and its adjacent land uses delineate the specific study area, the demand analysis necessitates consideration of a much broader region. Regional demand, as discussed in this study, refers to the 14 East Central Counties of the State. Local demand for recreation facilities as it directly affects the Saginaw River has been reviewed from the perspective of Bay and Saginaw Counties, as well as those jurisdictions found within these two counties.

Existing Land Uses

An initial task in the development of this study is to inventory the present land uses found along the Saginaw River boundaries. Specific land uses, locations and acreages were documented utilizing existing information available from the Michigan Department of Natural Resources (see Figure V-2). Once tabulated, land uses were analyzed to understand problems and opportunities in the study area. Recreational land uses within the river corridor were analyzed independently, in light of surrounding land uses. The following observations summarize the existing land use patterns along the Saginaw River

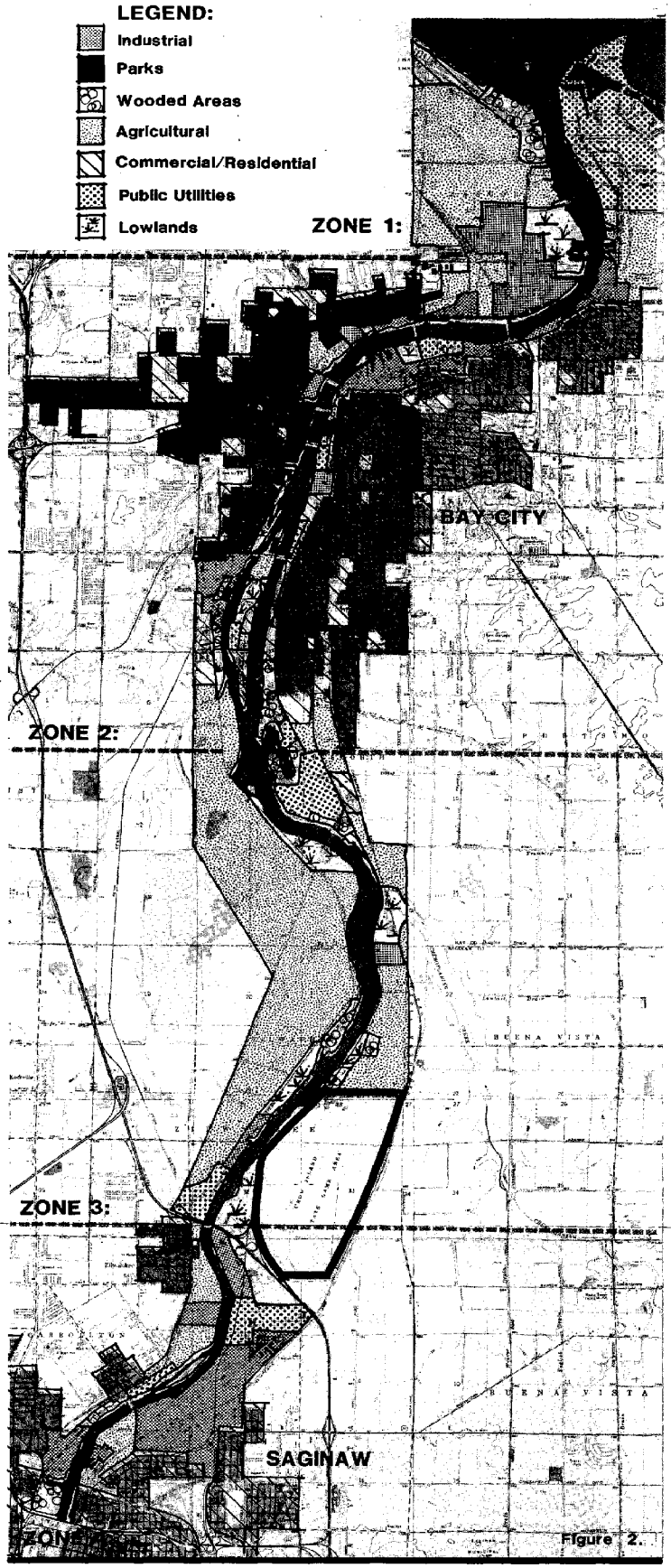


Figure 2.

Saginaw River Port Development Study

Existing Land Use

Transportation and Economic Research Associates, Inc.

Johnson, Johnson & Roy/inc.

corridor. For discussion purposes this corridor has been divided into four zones:

Zone I. This zone extends from the mouth of the river at Saginaw Bay to the beginning of the urbanized areas of Essexville and Bay City. This zone also includes the Army Corp. of Engineer's spoils disposal island located north of the river mouth.

Land uses are primarily industrial and utility in this zone. Frequent travel and docking of commercial vessels occurs along the Saginaw River in this area. Many commercial marinas are located here, resulting in travel and dockage of numerous pleasure craft. The overall character of the waterfront in this zone is highly "industrial".

Zone II. This zone is comprised of the Bay City and Essexville matropolitan regions. Land uses in this zone are many and intermittantly arranged. Residential and commercial developments are the predominant use within Bay City. Industrial uses are scattered throughout the zone along the waterfront. Many industrial uses are adjacent to residential and commercial areas, producing a relationship that is undesirable. Several small parks are located in this zone with an array of land uses adjacent to them. Agricultural land uses border the waterfront in the southern portion of the zone. The character of the waterfront is diverse ranging from highly developed in the northern industrial areas to rural and natural in the southern portion.

Zone III. This zone is located between the southern limits of Bay City metropolitan area and the northern Saginaw area. It is predominantly agricultural along the Saginaw River border, producing a rural, open character. A few scattered industrial/commercial land uses occur which utilize the railroad adjacent to the western river bank. A linear roadside park parallels the river along its eastern border. A major State Game Area is located in the southeast corner of this zone.

Zone IV. The urbanized areas of Carrollton, Zilwaukee and Saginaw comprise this zone. A large industrial development dominates the east side of the Saginaw River. The character of the river in this area is intensely industrial and includes the industrial facilities, mooring areas for commercial vessels and storage piles of raw materials. South of the industrial area residential and commercial land uses are found in the City of Saginaw.

The character of the waterfront is a highly developed hard edge within the Saginaw Central Business District. South of the Central Business District, scattered recreational, commercial, and industrial uses are found along the waterfront. A major park occupies the eastern edges of the waterfront.

The following table lists the percent of river frontage occupied by each land use type.

TABLE V-I

STUDY CORRIDOR LAND USAGE

Recreational	5%
Marinas & Yacht Basins	1%
Saginaw River and Streams	14%
Wetlands	3%
Vacant Woodlots	3%
Residential	19%
Marine Terminals	7%
Industrial Properties	10%
Utilities & Transportation	12%
Agricultural	26%
	100%

The final step in the discussion of existing land uses is to conduct a detailed analysis of recreational land uses. The following analysis identifies existing, proposed and potential recreational facilities found along the Saginaw River Corridor.

Recreation Resource Analysis

The specific task of this study segment is to evaluate existing recreation facilities, proposed new facilities and other potential recreation related opportunities which could be exploited. A site evaluation for each existing facility was conducted, using surface and air survey techniques. The size, location, amenities, and physical conditions of each facility was documented. Accessibility by land and water was evaluated as well as the physical capacity of each site. A detailed analysis for each site is included as an addendum at the back of this study.

Current development proposals of future recreational facilities were also reviewed and analyzed, as well as any potential opportunities for new recreational developments. A summary of the findings by zone is presented below and in Figure V-3.

Zone I: River Mouth and Bay.

Existing Facilities: This zone of intense industrial use contains no public recreation property adjacent to the Saginaw River. The Quanicassee Wildlife Area and campgrounds are located at the northeast limits of this zone adjacent to the Saginaw Bay. The wildlife area provides extensive recreational opportunities, including public boat launching. Three commercial marinas located in this zone provide boat mooring, launching and storage. Many large commercial vessels and sailboats find this area most desirable because of the lack of bridge hinderances.

Proposed Facilities: The Michigan Department of Natural Resources has studied the potential for developing a public boat launch near the mouth of the river along its western edge to provide direct accessibility to Saginaw Bay.

Potential Opportunities: Land available for the development of a public or private marina exists along the eastern edge of the Saginaw River north of Essexville. The sites close proximity to the bay, substantial size and good vehicular access make it highly desirable for marina development.

Zone II: Bay City Area.

Existing Recreation Facilities: Most of the existing park facilities developed to service Bay City and adjacent communities are located within this zone. These parks are located among an array of land uses and are often isolated by the adjacent uses. Many existing parks are located near the river edge but only a few are adjacent to it and have activities dependent on the water. Examples are the existing boat launches and fishing areas found within this zone. Ball fields are found within Defoe, Coryell, Dow Field and Veterans Memorial Park, a recreational activity which doesn't benefit strongly from a waterfront location.

Much of the shoreline is occupied by industrial and commercial activities which prevent accessibility and viewing of the river from major residential areas. This is particularly true along the eastern shoreline where marinas and commercial land uses are found.

The marina development located within this zone provides mooring and launching for primarily small craft and sailboats. This location is not as desirable for boaters whose destination is the Saginaw Bay because one must contend with traveling under the bridges located along the river. The existing boat launch in Veteran's Memorial Park is extensively used and shows signs of disrepair. The recently developed urban plaza at Wenonah Park provides a community gathering area downtown, adjacent to the Saginaw River waterfront.

Proposed Facilities: Plans are currently underway to upgrade both the layout and quality of Veteran's Memorial Park in Bay City. Also underway is an effort to develop an arboretum adjacent to Veteran's Park and a linear park extension southward. A proposal to develop another public boat launch on the eastern river bank is currently being discussed.

Potential-Opportunities: Many opportunities exist within this zone to improve recreational activities for this area. The opportunity exists to expand the existing parks along the western river bank to meet future demands for recreational activities. A stronger water orientation can be achieved by expanding parks to the water's edge and developing waterfront activities, like mooring areas, fishing docks and promenades. The eastern riverbank could service residential needs through the creation of linear parks on unused and vacated industrial lands.

The potential to promote long term relocation of commercial land uses along the eastern waterfront exists when uses are not dependent on the river for operations. The opportunity also exists to acquire a major wooded parcel at Skull Island for community recreation use, providing for a wide range of active and passive activities. Examples could include increased beach frontage, nature trails, picnic areas, fishing piers and scenic overlooks. The largely vacant Middle Ground Island offers the potential to develop a major water oriented recreational feature or activity generator which would attract boat users into the urban area of Bay City. This facility could potentially serve both local and regional demand. Vacant waterfront property exists in Essexville which could potentially be acquired to expand this cities waterfront park.

Zone III; Mid River Area.

Existing Facilities: Consisting of primarily rural agricultural land uses, Zone III has a lower demand and hence, supply of

recreational facilities. The existing Veteran's Memorial Park found along Highway M-13 is the primary recreation facility in this area. Usage of the waterfront in this zone is for fishing and passive viewing. The Crow Island State Game area provides a refuge for wildlife and a good area for seasonal hunting. A small commercial marina provides mooring and a launching facility for boaters in this zone.

Proposed Facilities: Plans are currently underway to provide a public boat launch in Veteran's Memorial Park. This is intended to serve increased fishing demands within the Saginaw River area.

Potential Opportunities: This zone is currently used for agricultural purposes and is largely undeveloped. As a result, the opportunity exists to expand future recreational opportunities to include the extension of the roadside park development along the eastern river edge and the development of additional fishing nodes. Hiking, biking, and scenic trails could potentially be located along the waterfront between Bay City and Saginaw. A long range goal of providing a similar linear park along the western river bank can be considered, should future demand in this region increase dramatically.

Zone IV: Saginaw Area.

Existing Facilities: Although the southern boundary for this study is considered to be the turning basin north of the Sixth Street bridge in northern Saginaw, existing recreation facilities found south of this point along the Saginaw River were also evaluated. Existing parks adjacent or near the waterfront currently exceed 130 acres. A full range of active and passive features exist in the mature and scenic developments found here. Water-oriented recreation activities include boat launches, fishing areas, and a linear park adjacent the river. No major waterfront recreational areas exist north of Interstate I-75, except a small boat launch in Zilwaukee.

Proposed Facilities: The City of Saginaw is currently discussing the potential of locating another public boat launch in the area as part of their effort to locate facilities at six mile intervals along the river.

Potential Opportunities: Many opportunities exist to develop waterfront recreation activities in the Zilwaukee and Carrollton Communitees. These vacant properties are located near major residential areas and have high recreation potential. An opportunity exists to extend the urban riverfront park developments of Saginaw further northward. Vantage points could be developed along both river banks to view the intensive industrial zone on the eastern shoreline. The opportunity exists to eventually link the Saginaw park system to Bay City by extending linear parks and/or designating scenic trails and paths.

In summary, the recreational development currently found along the Saginaw River represents the effort of various communities attemtping to meet their own individual recreational needs.

In contrast to this pattern, this study focuses on the Saginaw River as one resource providing recreational opportunites ranging from local to regional scope. Specific recommendations regarding future recreation opportunities will be designed to meet the demands of the total waterfront.

Recreational Demand Analysis

Regional Recreation Demand

The Saginaw River is located within the East Central area of the State of Michigan. Beginning at the confluence of four rivers, the Cass, Flint, Shiawassee and Tittabawassee, it travels northward through the major cities of Saginaw and Bay City before emptying into the Saginaw Bay. The river itself is approximately 22 miles in length. Historically, the river has played two roles; that of a commercial transportation route, and that of a recreational watercourse. The surrounding East Central Region of Michigan, consisting of 14 counties, has an extensive range of natural resources which serve a variety of recreational functions. Saginaw Bay with its miles of sandy beaches, numerous inland lakes and a variety of streams and rivers, is an area rich in recreation opportunities. The region offers several recreational attractions including State forests, National forests, inland lakes, and the Saginaw Bay - Lake Huron shoreline.

The natural features of the region have not gone unrecognized by area residents, campers, tourists, boaters, and seasonal homeowners. Easy access from downstate metropolitan areas, as well as the short traveling time required to reach these facilities has resulted in a demand for recreation facilities which serve not only the region's population, but also people drawn from a much broader area.

Recreation needs of regionwise significance were analyzed by the East Central Regional Planning Commission in an attempt to provide a cursory review of existing facilities and future demand. Based on a population of 690,000 in 1970, the Commission estimated regional recreational space needs at 6,900 acres. At that time land contained in State Parks within the region amounted to 7,183 acres, more than enough to meet current needs. Even

with significant growth in population levels, projected to reach 1,000,000 by the year 2000 (see Table V-2), existing public lands within the region more than satisfy long term acreage needs.

TABLE V-2
AREA POPULATION

AREA	1970 Actual	2000 Projected
East Central Michigan Region	690,000	1,000,000
Bay County	117,000	136,000
Bangor Township	15,900	
Hampton Township	6,900	
Portsmouth Township	4,100	
Frankenlust Township	2,000	
Essexville	5,000	
Bay City	49,500	
Saginaw County	219,700	245,000
Buena Vista Township	13,700	
Carrollton	8,500	
Saginaw Township	27,500	
Zilwaukee	2,200	
Saginaw	92,000	

Source: Bay County Parks and Recreation Department, Bay County Recreation Plan; July 1976
Saginaw County Parks and Recreation Department, Recreation Plan; 1980
East Central Planning and Development Region, Recreation Facilities; 1976

Although sufficient acreage exists regionwide, most lands are currently undeveloped for activity usage. As a result, insufficient recreation opportunities exist. The East Central Region Recreation Analysis identified areas of deficiency which are of particular interest to the Saginaw River Corridor. These deficiencies include mooring sites, launch facilities and several types of trails.

The continuing growth of Great Lakes fishing has created demand for mooring and launching sites on the Great Lakes and connecting rivers which is far beyond previous levels of programming, and which will continue to require years of catch-up effort.

Of the approximately 134 boat launching facilities throughout the 14 county area, there are less than 20 that have the features necessary for good launching conditions, which include adequate water depth and a hard surface. As a result, there is a need to develop additional access to many of the regions lakes, rivers and streams as well as upgrade existing sites. Further, improvement in support facilities such as parking at access points is also necessary.

Although the region is rich in the amount of forested areas, there tends to be a shortage in the various types of trails. Approximately 460 miles of both bicycle and horse trails were needed in 1970, with foot trail needs of nearly 200 miles. By 2020, trail mileage needs will increase to 930 for bicycling, 260 for horseback riding, and 760 for foot travel.

Local Recreation Demand

Current properties devoted to recreational use do not appear adequate to meet projected long term needs. Land deficiencies within Bay and Saginaw Counties are expected to reach approximately

4,100 acres of land, based on Bay and Saginaw County planning standards (see table 3). Definitions and standards which form the basis of this estimate are discussed below:

- Neighborhood Parks. The neighborhood park is a passive type of recreation facility which serves the needs of the neighborhood residents. A neighborhood park should be a part of the local neighborhood, adding aesthetic quality to the surrounding environment. The park should be within an easy walking distance of one quarter to one half mile of the neighborhood. A planning standard of three acres per 1,000 population is used in this analysis to assess acreage needs.

- Community Parks. A community park is typically larger than the neighborhood park, offering more activities and serving a larger population. Community parks serve aesthetic community goals as well as providing a visual and educational recreation role. Community parks are more inclusive in their landscape treatment than the neighborhood park and may contain features like athletic fields, picnic areas, botanical gardens, aquariums, zoos or other educationally oriented facilities. A planning standard of five acres per 1,000 population is used in assessing needs.

- Urban Regional Parks. These are facilities which serve the entire community, and depending on the size of the facility and the character of its environs, may attract people from beyond the urban area. Urban regional parks typically offer several passive and active recreation opportunities. A planning standard of two acres per 1,000 population is used in assessing needs.

- Regional Parks. These facilities serve a large geographic region, such as a county or multi-county area. A full range of recreational facilities is typically offered. Regional parks are intended to serve as a means for bringing about a more desirable configuration of the urban environment. Regional facilities and parks may be state, federal, regional authority, county or multi-county developments. A planning standard of ten to fifteen acres per 1,000 population is used in assessing needs.

Bay County. Regional recreation facilities within Bay County are more than adequate to meet long term needs. The major deficiencies are evident within the urbanized areas of

the County. Substantial land areas appear necessary to satisfy long term community and neighborhood park needs, requiring expanded land acquisition programs.

TABLE V-3

RECREATIONAL ACREAGE PROJECTIONS

YEAR 2000

Facility Type	Existing Acreage	Year 2000 Acreage Needs	Year 2000 Deficit
Bay County			
Neighborhood	100	330	230
Community	190	480	290
Urban Regional	160	190	30
Regional	2,265	2,040	-----
Bay County Total	2,715	3,040	550
Saignaw County			
Neighborhood	130	510	380
Community	590	850	260
Urban Regional	430	340	-----
Regional	630	3,000	2,370
Saginaw County Total	1,780	4,700	3,010
TWO COUNTY TOTAL:	4,495	7,740	3,560

Source: Bay County Parks and Recreation Department, Bay County Recreation Plan; July 1976
Saginaw County Parks and Recreation Department, Recreation Plan; 1980
East Central Planning and Development Region
City of Saginaw Parks and Recreation Department, Parks, Recreation and Open Space Plan; 1978
Johnson, Johnson & Roy/inc.

In addition to expansion of the neighborhood and community park facilities throughout the urban area, a linear park system which capitalizes on the watercourses within Bay County is proposed. Although acquisition of waterfront property will only indirectly satisfy community and neighborhood land needs, a linear park corridor along the Saginaw River is considered to be of high importance to all people within the County.

Specific deficiencies for recreation facilities which relate to the portion of the Saginaw River Corridor within Bay County include the following:

- Picnic Areas. Few good picnic areas exist within Bay County and most existing areas lack environmental qualities which enhance park usage, such as scenic views and mature tree cover.

- Nature Centers. Natural environments with sensitive features should be preserved and capitalized upon as a recreational asset in the County.

- Boating. Bay county is currently operating a fish restocking program and encouraging other communities to do the same. Success of this program is expected to substantially increase the demand for fishing, and concurrently, for boat launching facilities, according to the Bay County Recreation Department. The need for the development of additional fishing areas along the river's edge will also increase.

- Pathways - Bikeways. All waterfront properties are proposed to be connected through pedestrian linkages which are oriented to the water.

In a recently updated Master Plan for Bay City, recommendations suggested a continuous open space system be developed along the River's edge, linking the City's suburban areas with the Central Business District. Special attention was given to sensitive lands found along the corridor which should remain

in their natural state. Existing public lands along this corridor, were proposed to serve a variety of passive and active needs, including ballfields, community activity centers and pedestrian viewing stations. In addition to concurring with the County on the need for pedestrian linkages along the River's edge, Bay City officials indicated the following recreation facilities should be pursued:

- Boating. Based on a survey conducted as part of the City's urban parks program, a need was identified for boating facilities to serve the recreational boater. Marina facilities, are at capacity and additional dockage is necessary (public or private) if future demand is to be met.

- Existing Riverfront Facilities. Bay City proposes expanding the active recreation uses located along the riverfront as a means to satisfy long term needs. Plans include the addition of tennis courts, ballfields, ice skating, sledding, acquariums and an arboretum.

- Wenona Park. A community focal point/activity center is proposed adjacent to the City's CBD. This facility will increase water access opportunities and generate new interest in the water's edge within the Community.

The City of Essexville currently has two launch facilities for boaters and anticipates the need for a third facility in the future. A need also exists for development of a riverfront park with fishing opportunities and playground equipment. The townships which front on the river have also expressed interest in developing more river related opportunites. The Hampton Township master plan suggests a need for development of a community park which can service a wide range of activites, including a boat ramp, picnic facilities and a ballfield. Portsmouth Township officials indicated long range plans anticipate expansion of the existing marina facility along the river. Long term needs identified by Frankenlust Township officials include campground facilities, improved fishing opportunities and possible

development of a boat launch in the future. Bangor Township recreation plans include completion of a new park facility, although located away from the Saginaw River. A boat launch on the Kawkawin River currently serves this township. If property along the river could be acquired, and reasonable access to the site existed, a boat launch facility may be accommodated.

Saginaw County. Saginaw County contains about twice the population found within Bay County. A large demand for recreation space is projected over the next twenty years, totalling 3,000 acres of regional recreation land by the year 2000. There are presently 630 acres of regional facilities within the County. Deficiencies are also evident within the urbanized population centers of the County. While urban-regional facilities appear adequate to satisfy long term demands, deficiencies within neighborhood and community park categories will continue.

The City of Saginaw, like Bay City, proposes to expand its linear riverfront park. The City has adopted a goal which suggests that the recreation, natural and scenic resources of the Saginaw River be capitalized upon. In order to accomplish this objective, the City is pursuing riverfront park development. A continuation of the existing river network is recommended, as well as broadening the types of recreation activities provided within these linear parkways. River oriented activities suggested by the City Recreation Department include a tour boat, music barge, canoe facilities and small boat docking opportunities.

The City of Zilwaukee's waterfront park, currently a passive recreation facility used for boat launching and picnics, requires modernization. Improvements would include

expanded picnic opportunities and upgrading docking facilities along the river's edge.

Area Boating Demand

A survey of commercial marina owners along the Saginaw River indicates that a large demand for boat massing facilities is going unmet. Over 90% of the marina operators surveyed, reporting over 1000 slips, indicated a severe shortage of spaces. The shortage is, however, limited to the northern portions of the river.

The east central region serves a statewide recreational market, with a large demand from downstate as well as local residents. Many of the large marinas indicated a need to increase size by almost 30% based upon existing demand. The State of Michigan, prior to the recent changes in the condition of the economy, projected a need for 200 long term mooring facilities and 100 transient facilities to help satisfy demand within the area.

A review of boater registration figures in Saginaw and Bay Counties indicate that on an average, one out of every fifteen residents are boat owners. Based on population projections for the year 2000, another 3,300 boat owners will reside in the region if past ownership patterns are followed. Sixty percent of these boats will require some type of mooring facility and these estimates consider only local demands.

In addition to the apparent need for boat mooring facilities within the region, boat launch sites are in demand. Of the existing boat launches along the Saginaw River, the conditions range from gravel to hard surface and each can accommodate varying types and numbers of boaters. Many facilities are in need of repair however, and lack adequate parking facilities. Based upon the anticipated increase in boaters

and the desire of many communities to improve water access, boat launching opportunities will need to be expanded in the future.

Demand Analysis Summary.

The Saginaw River corridor was divided into four separate activity zones to help facilitate the analysis. The delineation of the four zones corresponds to changing natural features and use characteristics of the river along the 22 mile corridor. Needs for each zone are discussed in detail below, and summarized in Figure V-4.

Zone I

Primary recreation activity in Zone I is limited to boating. For many reasons, this stretch of river is highly desirable for the launching and mooring of recreational craft. The Saginaw Bay is the primary destination area for boaters in the region. Boaters traveling northward from the southern metropolitan areas find this stretch of the river to be an ideal place to launch and/or moor their watercraft. Launch sites further south involved additional water travel time prior to reaching the Bay. The several bridges along the Saginaw River also cause delay for large watercraft and sailboats. This area also becomes a destination point during storm conditions in the Bay. The river mouth forms a natural harbor of refuge, thereby creating a need for transient slips and mooring space.

Private marina operators report that business is strong. Operators in this area would expand capacity if the opportunity existed. Most facilities are physically constrained laterally by on-shore property boundaries and are prevented from expanding further into the river because of the shipping channel. A clear need exists to expand transient and seasonal

slips in the range of the 300 slips estimated by the Michigan Department of Natural Resources. The need also exists to provide for public launch ramps with adequate parking and access. Both needs could be satisfied at a single new facility.

The industrial character of the waterfront and light population density limits the demand for intensive recreational activities in the zone. The area is not a prefered location for fishing or swimming, nor for on-shore recreation activities.

Zone II

The residential population located on both sides of the river in this zone creates the need for access to the waterfront and for passive and active recreation uses along the waterfront. The projected shortage of neighborhood and community parklands in this area could partially be aleviated by the development of riverfront access and waterfront parks.

The Bay City Central Business District is currently shielded from the river. Midday and evening pedestrian activity could be enhanced by better access. Bay City is already taking steps to link the business district with the positive features and opportunities offered by the river.

Public boat access to the river is limited in this area where the need exists. Additional access with parking is needed at the northern and southern portions of the zone. The Bay City Central Business District offers an opportunity to develop a destination point for local boaters and potentially for boaters on the Saginaw Bay. The development of an activity area with transient mooring facilities, picnic

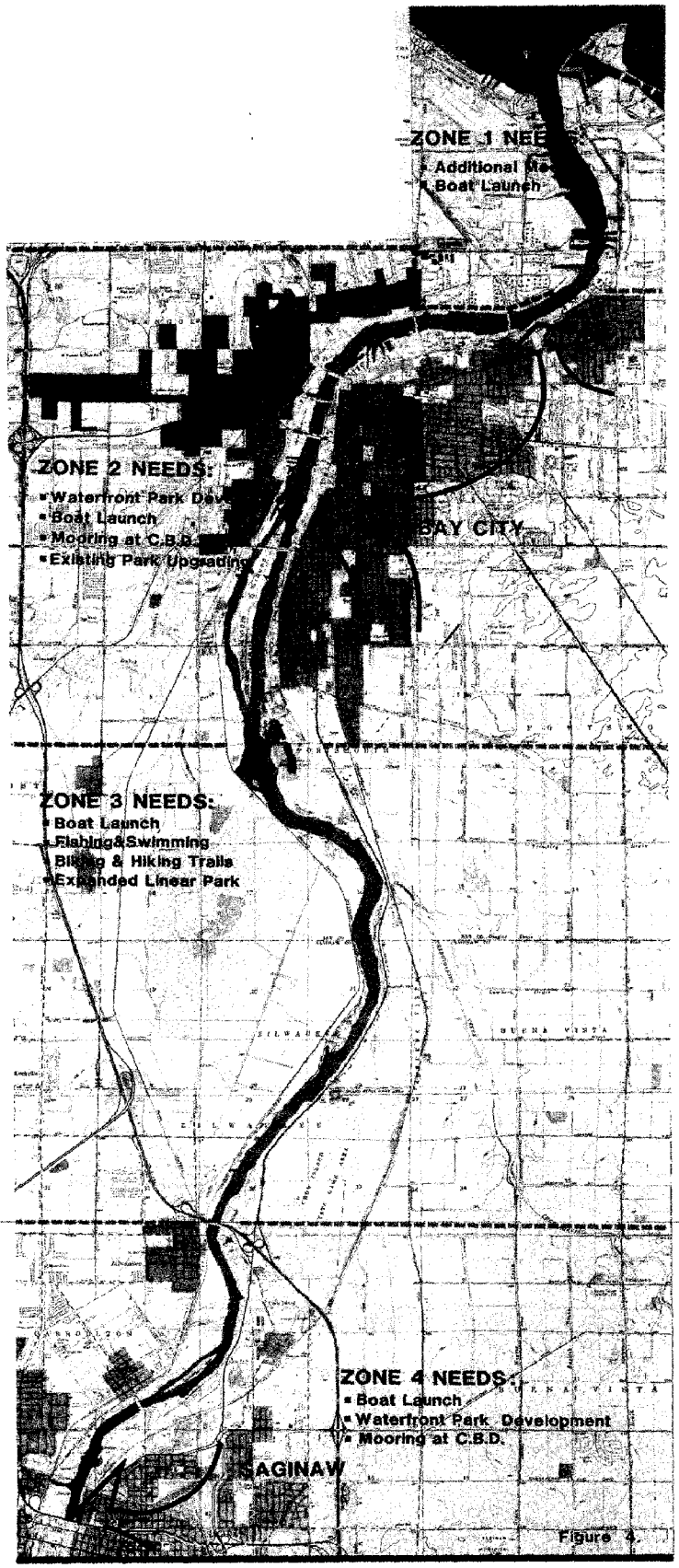


Figure 4

Saginaw River Port Development Study

1/2 0 1 MILES

Demand Analysis

Transportation and Economic Research Associates, Inc. Johnson, Johnson & Roy/inc.

facilities and passive and active activities could generate significant visitor traffic.

The industrial uses on the riverfront in conjunction with boating activity in the zone limits safe or desirable fishing and swimming in the zone.

Zone III

Currently, the zone is primarily used as a travel corridor for water and land transportation between the two urbanized zones. The rural character of the zone offers special opportunities for open space uses not available in the surrounding urbanized areas.

The physical and aesthetic character of the zone lends itself to providing for the fishing and swimming opportunities which are highly desired in the area, but which are not currently available. Rising gasoline prices and continuing population growth increases the resource value of this zone for the nearby populace.

Improved boat access and transient mooring space in this zone is currently in need and should be programmed for future provision as well. This stretch of the river has the best water quality and lowest activity concentration. Fishing and swimming opportunities should be developed.

The area is within easy water travel time from both urbanized areas to the north and south. Provisions of mooring space along with massive and active recreational opportunities could make this area an ideal destination point for boaters. Likewise, public ramps could make this area an ideal origin point for visiting Bay City or Saginaw by day boaters.

The non-industrial river front also provides the chance for development of walking and biking trails linking the two urbanized areas. The concept of a lineal greenbelt is both desired and needed in the area.

Zone IV

Zone IV has attributes and needs similar to Zone II. The population concentrations adjacent to the river generate the need for riverfront access and passive and active recreational activites adjoining the river. The City of Saginaw is well into a program of opening up the riverfront to the residential and commercial areas of the City. Improved access is still needed, however, in Zilwaukee. Improved riverfront access for residents in the northern limits of Saginaw and Zilwaukee should be encouraged.

Public boat ramps and parking are needed in the zone. Transient and seasonal slip space appears to be adequate for the present time. Most boating activity in this area is generated by local day users. The distance from the Saginaw Bay and the various impediments limits the desirability of the area to weekend boaters traveling northward from the south. The zone is desirable for local boaters for day trips and to travel northward for fishing or to visit the Bay City area. Similarly, boaters should be encouraged in the future to travel from points north for day excursions into the City of Saginaw.

Recreational Development Findings

The final step in this process is the preparation of the Recreation Framework Plan. This plan is the result of combining the recreation resource analysis with demand analysis. The following text addresses specific deficencies which are a result of existing and/or future demands for recreational facilities. The Framework Plan provides recommended actions which should be taken over a period of time to relieve the noted deficiencies. For consistency, the analysis is described by zone and is graphically shown in Figure V-5.

Zone I

Deficiencies: An immediate need exists for an additional boat launch with adequate parking and vehicular access to provide direct boating access to the Saginaw Bay. A need also exists for additional mooring space for pleasure craft.

Recommendations:

1. Develop an additional public boat launch in the near future along the eastern riverbank south of the existing yacht club. Although this location is not immediately adjacent to the Saginaw Bay, accessibility is better than on the western side.

2. Encourage expansion of existing commercial marinas where possible, and encourage the development of an additional marina along the eastern riverbank south of the existing yacht club near Essexville as a high priority. Several marinas within this zone have already planned to expand. An emphasis on the Saginaw River maritime history would be most appropriate should a new marina development occur.

3. A long range opportunity to develop additional boat mooring and launching facilities exists at the old Coast Guard location along the river's western edge. This would be dependent upon substantially improved access to the area and the assurance that the environmental quality of this lowland area would not be substantially altered.

4. Develop the Spoil Island in Saginaw Bay over the long term into a regional scale recreation facility with transient mooring facilities. Because of the long interval before this site can be utilized, the only immediate need is to initiate conceptual planning.

Zone II

Deficiencies: An immediate need exists for an additional boat launch along the eastern riverbank near the south end of Bay City to service local residents needs. The need also exists for transient mooring facilities to provide accessibility to the downtown. Longer term needs include the development of an eastern riverfront recreational facility for adjacent residents; additional mooring facilities in the form of a commercial or municipal marina; and a major recreation activity generator on the middle ground to service local, community and regional needs. A continuing need exists to upgrade and expand the existing community parks.

Recommendations

1. Develop a public boat launch with adequate parking in the southern Bay City area as potential land becomes available. Both the 33rd Street and Skull Island areas offer potential for boat launch development.

2. Consider the development of a docking facility for day use pleasure craft in the Wenonah Park area. This would allow boaters the opportunity to experience the commercial areas of Bay City.

3. Acquire vacant eastern riverfront property over a period of years to develop both active and passive recreation. Consider the relocation of land uses not dependent on the river resource where economically feasible. Promote future recreation and residential developments along the eastern shore.

4. Instigate the development of a marina adjacent the Central Business District of Bay City by either the private or public sector. The City should serve as an agent to ensure its appropriate development should a marina be developed by the private sector. The facility could potentially be located along the western riverbank north of Veterans Memorial Park.

5. Continue to upgrade the quality and quantity of recreation facilities to respond to increasing future demands for activities, at both a local and regional level, specifically;

   a. Expand Defoe Park to the rivers edge by acquiring nearby properties adjacent to the waterfront. This will allow for the potential development of a major community park offering expanded, water-oriented activities.

   b. Continue to upgrade the quality and quantity of recreational activities in Veterans Memorial Park. Develop a facility having a stronger water orientation and maritime theme. Provide fishing docks, a transient mooring area, and river promenades. Encourage its use for community events, shows, and fairs which focus upon the river.

   c. Because of its strategic industrial location, Dow Field (Dore Park) should not receive major capital improvements until future industrial demands are better accessed.

   d. Acquire the Skull Island woodlot area and develop a community park. Include both passive and active waterfront recreation activities for south eastern Bay City residents. Activities should capitalize on the sites scenic character and include picnic, fishing and swimming areas, and scenic overviews.

   e. Expand the Essexville waterfront park northward by acquiring adjacent vacant properties for active and passive recreational uses. Upgrade the quality of existing boat launches here.

6. Develop the Middle Ground as a major recreational activity generator to service a community and regional scale. A strong water orientation should occur and include a transient mooring area and boat launch facility along the western island edge away from the traffic of the shipping channel.

Zone III

Deficiencies: A boat launch within this zone is needed to meet increasing local and regional demands for river access, particularly as fishing activities within the river increases. A long term need exists to continue the expansion of the linear

parks currently developed along the eastern shoreline for fishing, hiking and scenic recreational activities.

Recommendations:

1. The opportunity exists to develop a public boat launch with good access and parking within Veteran's Memorial Park. This opportunity should be purused.

2. Develop fishing nodes, swimming areas, designated pathways and scenic overlooks within an expanded linear park between Saginaw and Bay City along the eastern shoreline. Continue a designated pathway through the industrial zone of northern Saginaw to provide a "visual and educational" tour of an intensely built land use. The pathway could be designated adjacent to a roadway having lower traffic.

Zone IV

Deficiencies: A short term need exists to develop another public boat launch in the northern Saginaw area. The need also exists to develop a transient docking facility adjacent the downtown Saginaw business district to provide landward access to boaters. Currently the need exists to reserve waterfront properties adjacent the commercial and residential neighborhoods of Zilwaukee and Carrollton for passive and active recreation usage.

Recommendations:

1. Vacant properties are available for the development of an additional public boat launch on the west bank of the river at Saginaw, north and south of the I-675 interchange. Efforts should be made to acquire property for this development with adequate parking and vehicular access.

2. As plans proceed with the development of Saginaw's urban riverfront park, provisions should be made for the location of a transient mooring facility to enable boaters to take advantage of the downtown commercial business district.

3. The communities of Zilwaukee and Carrollton should acquire and develop water oriented parks on available vacant land near their residential and commercial districts. Vacant lowlands and wooded parcels are particularly desirable for both passive and active recreation use and should be reserved from development of industrial uses. Small parcels within the commercial areas can be developed for fishing and passive viewing of the waterfront and adjacent commercial activity. Waterfront prominades can provide passive linear recreation activity within this area also.

Recreational Development Plan

The recommendations presented in the Framework Plan are intended to serve as a guide for the orderly development of recreation facilities along the Saginaw River Corridor. As a tool for guiding future development, the Framework Plan interfaces competing land uses and establishes a program for capitalizing on the unique recreational opportunities the river offers. It should be noted that the Framework Plan delineates both land related and water related recreation opportunities.

As demand for recreation activities change through time, the Framework Plan will require periodic review and update.

The extent to which the recommendations of this plan can be realized will depend largely on public and private demands, together with local recognition of the need for expansion of recreational opportunities. As vacant non-recreational land uses along the rivers edge become scarcer over time, it is intended that this Recreation Framework Plan be used to determine the highest and best use for properties within the Saginaw River Study Corridor.

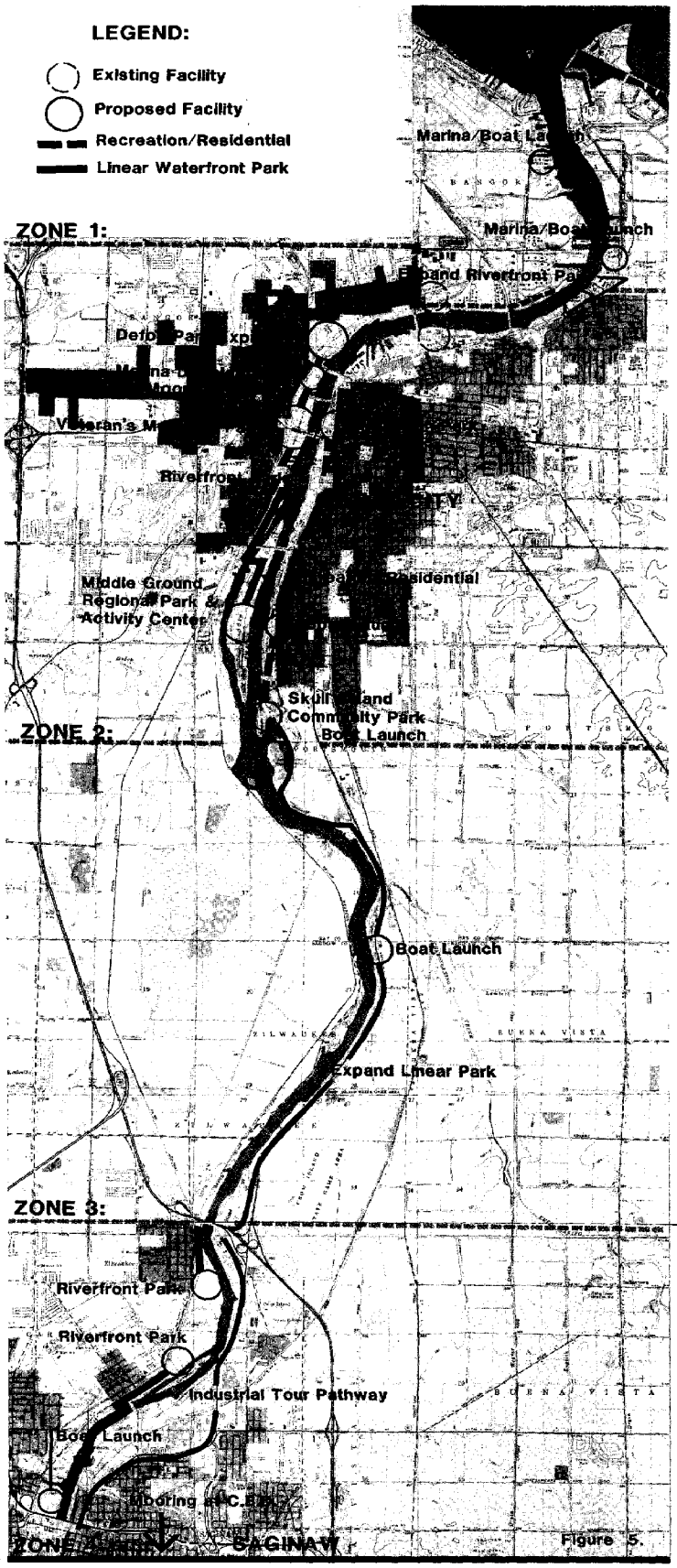


Figure 5.

Saginaw River Port Development Study

1/2 0 1 MILES

Framework Plan

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VI. INTEGRATED DEVELOPMENT PLAN

An integrated development plan summarizes the analyses and findings of the preceeding chapters. By request of the study's sponsors, this is a balanced waterfront use plan that recognizes both commercial and recreational needs. Of necessity, this plan must be consistent with the State of Michigan Coastal Management Program - and by definition this is consistent with Federal Coastal Zone legislation and implementing regulations. By design, the plan is intended to maximize the economic value of a finite resource while satisfying environmental aesthetic and social requisites.

This study's approach to an integrated development plan was to identify all port development opportunities, recreational as well as commercial, in order to identify growth constraints as well as conflicts in uses. The report was not designed to avoid conflicts of use by absence of growth. Neither did it deliberately create adversary situations by trying to fit all commercial and recreational activities into the two ends of the river that are most attractive for both. Based on this realistic approach, the study itself produced few use conflicts to resolve.

Plan Integration Criteria

As noted in the Introduction, the Coastal Zone Management Act of 1972 recognizes shoreline and riverfrontage as a finite resource to be preserved, protected and developed. Neither the Federal law nor the Michigan Coastal Management Program defines a specific plan or planning process whereby

these goals are to be achieved. This flexibility allows for plans that recognize locally perceived needs, but doesn't define a formal integration process for those plans. This section addresses plan integration, external as well as internal, as follows:

- Consistency with Coastal Zone Management planning criteria.
- Consistency with existing plans in the coastal zone.
- Internal plan consistency.

Coastal Zone Management

Through a unique "local option" philosophy in the Federal law, each cooperating coastal state has devised its own Coastal Zone Management plan. In the case of Michigan, the "plan" provides criteria for the uses of the coastal zone as defined. There is no comprehensive coastal zone "law" per se, and implementation is via existing regulatory authorities, both state and local. At the state level, the Division of Land Resource Programs of Michigan's Department of Natural Resources has responsibility for administering the state's coastal related legislation, interagency coordination, and conflict resolution. The ultimate responsibility for coastal zone management resides at the local level, via local planning and zoning agencies.

The Coastal Management Program generally defines Michigan's coastal zone as the area within 1,000 feet of the Great Lakes coast and connecting bays and waterways; with extensions inland to encompass distinctly coastal related uses, public (non-federal) facilities, and physical features (e.g., marshes and flood plains). Once the broad dimensions of the coastal boundary were determined,

the boundary was refined in some locations to follow readily recognizable physical features such as roads. Its importance to Great Lakes navigation is the chief reason why the Saginaw River, up to the head of navigation, is included within the state's coastal boundary. Along the Saginaw River, the boundary follows the same overall pattern (about 1000' width with extensions) as along the Great Lakes. The study area was the Saginaw River and adjacent 1,000 foot corridors on either bank, between the Saginaw Bay Diked Disposal Facility and the Sixth Street Turning Basin in Saginaw. All of this study area is within Michigan's coastal zone. All the land area is within FIA's designated floodplain, and subject to floodplain management and ordinances.

The key elements of Michigan's Coastal Management Program are:

1. Resource Areas
2. Areas of Particular Concern (APC)
3. Centralized Administration, Permitting and Conflict Resolution

The two "areas" are a device to identify applicable laws and policy statements, and the degree of management attention. "Resource Areas" are defined by resource category but not specifically identified otherwise, "Areas of Particular Concern" are site specific and mandated by law or designated after nomination. The former, grouped in five resource categories, receive routine surveillance and are eligible for certain action programs. The APC's receive more intensive management, both "carrot" and "tick". Although land use per se does not require a permit, substantially all activities within the "areas" require permits under one or more of the applicable laws. In the case of waterfront construction, a Corps of Engineers administered Federal permit system parallels the state's.

The study area, in whole or in part, comes within the definitions of the five "Resource Areas." The consistency of the study's recommendations with the relevant state laws and policies is as follows:

(1) Areas of natural hazard to development, including erosion and flood prone areas. Shore erosion is not applicable. No construction is proposed beyond established bulkhead lines, hence there would be no encroachment on the floodway. The waterfront recreational and commercial facilities would be in the floodplain. By their nature, they cannot be flood-proofed by elevation, but can be designed to minimize damage from high water.

(2) Areas sensitive to alteration or disturbance, including wetlands, natural areas and islands. The riverfrontage along one mile of the Saginaw immediately upstream of the river mouth may be an "ecologically sensitive" area within the meaning of the state's management program. Accordingly, this study did not recommend development of facilities in this area although it is a highly attractive area for development - particularly for recreational facilities. Preliminary review of the Shorelands Protection and Management Act, and the Soil Erosion and Sedimentation Act indicate these are not applicable, but the Goemaere-Anderson Wetland Protection Act probably is. The permitting procedure in the latter would provide a suitable forum for determining the development potential of this riverfrontage.

The Skull Island woodlot area south of Bay City may be a "natural area" within the meaning of the state's management program. For this reason, the study did not recommend use of this area for dredged material disposal, even though it has been used for that purpose in the past, and it was considered for future disposal requirements. The study recommended development of Skull Island as a recreation area as more consistent with the state program than it present intended industrial use, or preservation in its present state.

In addition to Skull Island, which is a peninsula rather than an island, the study recommended development of three islands within the study area for recreational use: Carrollton Bar, Middle Ground, and the Saginaw Bay Diked Disposal Facility. Michigan policy to preserve and protect islands is oriented to offshore islands. Because the Bay

facility is man-made and Middle Ground is highly if not appropriately developed already, the study's recommendations that these be made into regional-scale recreation facilities are believed to be consistent with state policy. Acquisition of Carrollton Bar for a future park with passive recreation uses was recommended as consistent with state policy and its present undeveloped state.

The Saginaw Bay diked disposal facility site was provided via the Great Lakes Submerged Land Act. The Act predates Michigan's coastal management program, but is incorporated in it by reference. The study has assumed that continued use of the Bay for spoil disposal is consistent with policy and precedent.

(3) Areas fulfilling recreational or cultural needs, to be managed to recognize recreational, historic and archaelogical values. Michigan policies to promote development of outdoor recreation facilities considerably predate its coastal management program. i.e. - Act 17 of 1921. The numerous policy statements incorporated into the program regulate development as well as encourage it. Collectively, the policies provide for management of coastal recreation resources, not maximum utilization. i.e. - DNR "shall establish priorities for fisheries management on waters of the state primarily on the basis of need, expected public benefits, and the desire for a balanced program."

The study's recommendations for recreation facilities were based on demand criteria related to local population projections, as explained in the text. These included parkland acreages and specific facilities. Facility siting was based on present and proposed facilities and waterway and waterfront uses, recreational and otherwise. The recommendations specifically reflected consideration of:

Waterway Safety - measures to minimize mixing of recreational and commercial vessel traffic.

Fisheries Development - anticipated increased recreational fishing activity reflecting the success of walleye pike plantings.

The study's recommendations are based on all identifiable needs for both commercial as well as recreational facilities. The study approach emphasized both all and identifiable. The "all" was to avoid maximizing one type of

development at the expense of the other. The "identifiable" required that needs be realistic, not "conceivable". This approach provides a basis for sound management of all coastal zone resources.

Concerning historical and archaelogical values, it is appropriate to note that the study approach treated these peripherially, and concentrated on recreational and commercial needs. A cursory check of the National Register of Historic Places did not identify any conflicts with recommended facility sites. Field work identified that two sites may have archaelogical value. The study has assumed that the permitting process required before any facility construction will provide adequate protection for historical and archaelogical values. The following sites are identified for future investigation:

Archaelogical - Skull Island area and Fletcher Oil property, recommended for recreational and commercial facilities respectively, may contain indian artifacts.

Historical - Defoe Shipyard site recommended for waterfront industry, would be an appropriate site for a maritime museum because of its proximity to downtown Bay City and its marginal utility for other commercial uses of the channel.

(4) Areas of natural economic potential, including water transportation, prime industrial and agricultural areas. Many policies in Michigan's coastal management program are designed to protect natural waterways from encroachment by industry. The Saginaw became an industrial waterway prior to the program, and the study's recommendations are designed to restore balance in development. The principal elements are:

(1) Consolidation of marine terminal activities at designated locations at Bay City and Saginaw, to provide more intensive use of the waterfrontand improve utilization of adjacent industrial properties.

(2) Expansion of recreation facilities elsewhere to increase use of the waterway and waterfront with a minimum conflict between uses.

Michigan has legislation for the protection of farmland. The state has also given qualified endorsement to winter navigation. This study takes these positions into

account:

(1) The study recognizes that prime farmland and wetlands are unacceptable sites for dredged materials.

(2) Commercial traffic forecasts do not assume winter navigation and are constrained accordingly.

(5) Areas of intensive or conflicting use, including coastal river months, bays and urban areas. The study itself is evidence of this concern. The Saginaw waterfront offers many examples of underutilization (but no true derelict facilities). The study's recommendations resolve most conflicts or potential conflicts with more intensive use of the waterfront. In the case of the Saginaw, this is an appropriate solution and consistent with good coastal zone management.

The foregoing concordance between the study's recommendations and the coastal program's requirements is equally applicable to "Areas of Particular Concern". The requirements for APC's are essentially the same as those for Areas of Concentration. Only a small portion of the study area has been identified formally as an APC, the Crow Island State Game Area. No other areas qualify for "legislative designation". "Commercial harbors" including the Saginaw have been nominated as APC's by Michigan DOT, but not designated. Several other areas have been nominated as industrial, recreational, and ecologically sensitive APC's. This study has considered the volues involved in these nominated APC's.

Consistency With Existing Plans

Numerous local and state plans were reviewed before, during, and after formulation of the study's recommendations. These plans included:

Bay County -	1975	Bay County Economic Adjustment Plan
	1975	Bay County Land Use Inventory
	1976	Bay County Recreation Plan
	1978	Bay City Area Transportation Study (partial)
	1979	Bay County OEDP Update
	1980	Annual Economic Surveillance Report

Bay City	-	1979	Master Plan
Bangor	-	--	Comprehensive Community Plan(undated)
Essexville	-	--	Master Plan (undated)
		1964	General Development Plan
Frankenlust	-	1976-1996	Community Development Plan
Hampton	-	1970	Comprehensive Plan
Portsmouth	-	1979-2000	Community Development Plan
Saginaw County	-	1970-1980	Transportation Surveillance Reports
		1977	Overall Economic Development Plan
		1979	Transportation Improvement Plan
		1979	Shattuck Road Corridor Impact Study
		1980	Parks, Recreation and Open Space Plan
Buena Vista Twp.	-	1980	Master Plan Map (partial)
Carrollton	-	--	Master Plan Map (undated)
Saginaw	-	--	Master Plan (undated)
		1980	Parks, Recreation and Open Space Plan
Zilwaukee	-	1979	Comprehensive Development Plan (draft)
Zilwaukee Twp.	-	1980	Master Plan Map (preliminary)
Midland County	-	1974	General Development Plan (summary)
Midland City	-	--	Master Plan Map (undated)
ECM Region	-	1977	Overall Economic Development Program
		1976	Regional Perspectives-Natural Elements
		1976	Regional Perspectives-Recreation Facilities
		1978	Regional Perspectives-Community Facilities
		1978	Regional Perspectives-Land Use Policies
		1978	Saginaw River Port Inventory
			Municipal Floodplain Management "Plans"
			Saginaw River Pollutants Mitigation Study
MDNR	-	1977	Coastal Management Program
		1979	Comprehensive Outdoor Recreation Plan

The consistency of the study's recommendations with relevant state and local plans is as follows:

Local Land Use Plans. The amount of recreation and commercial facilities needed was determined by (1) demand analysis in the study, (2) preceived needs of local officials, and (3) identified needs in those development plans that were available. Not all communities have development plans. The location of those facilities was determined by compatibility with existing or proposed land uses and infrastructure. The recommendations are therefore consistent with the general intent of local plans. By definition they are not all identical with present or planned site specific land uses.

This study did not review the municipal ordinances implementing the master plans and/or floodplain plans. This level of effort was beyond the scope of this study. The permitting process required by any facility construction will provide such disclosure.

Transportation Plans. Coastal Zone plans for many states require port authorities to prepare long range plans in order to identify and reserve waterfrontage needed. The Michigan Coastal Management Program does not require such plans. The study's recommendations are an embrionic long range plan.

The study's recommendations for commercial facilities at Bay City recognize existing highway constraints and are designed to minimize impact on downtown traffic. They are predicated on using Wilder Road for heavy truck access. This road is presently adequate. It may not be if the facilities produce a significant increase in traffic.

This study and others recognize the desirability of improving access to the river at Bangor. Traffic circulation via a connection to Aplin Beach would be most desirable. The study recommendations recognize the present access constraints.

The proposed Shattuck Road extension to include another bridge crossing at Saginaw would produce one more vessel-vehicle traffic conflict. Alternately, the Sixth Street Turning Basin could be relocated downstream of the bridge. There are no significant commercial facilities upstream of the proposed location.

The study recommendations have been designed to minimize bridge openings.

Park and Recreation Plans. The study's recommendations are consistent with the goals and guidelines of the Bay and Saginaw County Plans and the State Plan. Where those plans are facility or site specific they are reflected in the study recommendations.

The only state recreation facility within the study area is Crow Island State Game Area. Bay City State Park and several wildlife areas are located in Sag Bay. The existing parks and public access/boat launching sites are city or county owned. The state recreation plan does not identify or propose additional recreation facilities for the Saginaw. The development of additional facilities depends on local initiative. Under ongoing programs, financial assistance by the state may be available to the local entities.

The DNR Waterways Division anticipates funding 50% of the boat launch that the study recommends for Saginaw Veteran's Memorial Park in 1980, and similar assistance with rehabilitation of the existing boat launch at Bay City Veteran's Memorial Park

in 1981. Earlier the state provided 90% of the cost of the existing Essexville boat launch. State financial assistance for a boat launch at Bangor has been considered, but no grant offer made because of lack of public access.

A summary of the study's interface with existing plans is as follows:

Entity	Master Plan	Transport Plan	Eco.Dev. Plan	Park/Rec. Plan	Flood Plan
Bay					
County		X	X	X	
City	X				X
Bangor	X				X
Essexville	X				X
Frankenlust	X				X
Hampton	X				X
Portsmouth	X				X
Saginaw					
County		X	X	X	
City	X				X
Buena Vista	X				X
Carrollton	X				X
Zilwaukee	X				X
Zilwaukee Twp.	X				X
Midland					
County		X			
City	X				
ECM Region		X	X	X	
MDNR	X			X	

Internal Plan Consistency

As on most rivers, there are two areas on the Saginaw that attract most development - the river mouth, and the head of navigation. For commerce, facilities near the Bay minimize vessel running time and the expense of a port call. Facilities farthest upstream are closer to most users, and maximize the use of low cost water transportation. For similar reasons, the two locations are equally attractive to recreational users. This has produced a concentration of facilities at the two ends of the river. The study's recommendations recognize the compelling logic that has produced this situation. They do not propose wholesale relocation of facilities. They do address use conflicts and their resolution by:

- segmented use of the riverfront
- more intensive use of the riverfront for designated uses.

Safety. The concentration of facilities and the use of the river by both commercial and recreational vessels produces conflicts related to safety. Safety takes priority over economics. To minimize vessel mixing:

(1) Commercial and recreational facilities are not intermixed. This applies to cross-channel uses as well as adjacent uses.

(2) Wherever possible, a passive recreation facility is used as a buffer between commercial facilities and active recreational facilities such as boat launching ramps and marinas.

Alternately, the study has used bridges in lieu of buffer zones, or used industrial waterfront as a buffer between marine terminal and active recreation uses.

(3) Numerically more recreational than commercial craft use the Saginaw. The former are an inconvenience on bridge openings; the latter a significant safety hazard to the bridges as well as the vessels. The study recommends concentrating marine terminal facilities close to the river mouth insofar as possible.

Economics. Coastal zone management recognizes that the economic benefits of water-dependent land uses do not equate with ability to pay for land. As a guide to priority of uses, this study used generalized estimates of total economic impact (primary, secondary, tertiary) per acre per year, as indicated in Table VI-1. The segmentation of river uses incorporates Table VI-1 with other practical considerations.

(1) The recommendations concentrate marine terminals at Bay City insofar as possible to facilitate vessel services and economize on dredging requirements. Commercial uses near the head of navigation are designated for low valued commodities where transportation cost is relatively more important.

(2) The heavy infrastructure required for commercial development (utilities, rail service) is not available at the river mouth, and is limited in the mid-river section. Hence, those two areas have been designated for more intensive recreational use. (Middle Ground and the linear park between Bay City and Saginaw have associated small craft activity.)

(3) The existing linear development of infrastructure along the river inhibits more intensive use of the waterfront. The study recommends two measures: consolidation of marine terminal activities; and development of marinas inland into basins rather than out into the shipping channel or along it. The latter recommendation would improve safety as well as economics.

TABLE VI-1

ESTIMATED ECONOMIC IMPACTS OF WATERFRONT LAND USE

(Per acre per year)

High Density Marine Terminals	$250,000[1]
Low Density Marine Terminals	100,000[1]
Marinas	25,000[2]
Industry (variables)	10,000[3]
Agriculture	800[3]
Wetlands	400[4]

1. AAPA, American Association of Port Authorities, "Advisory", No. 29, July 21, 1980. Tonnage capacities of marine terminals from Mar Ad, economic impact per ton from AAPA.

2. Donald E. Hillman, Jr., Manager, Property Department, Port of San Diego, California, Sept. 26, 1978.

3. Estimates by TERA, Inc.

4. State of Michigan Coastal Management Program and Final Environmental Impact Statement, U.S. Dept. of Commerce, July 1978.

Aesthetics. For practical reasons it is necessary to alternate commercial and recreational use of the river. This is also an appropriate solution aesthetically. The recommendations provide measures for transition between uses. Within areas designated for commercial development, recreation is integrated via passive facilities that provide visual access. These also provide a buffer between commercial uses and the adjacent residential community.

Integrated Development Plan

Figure IV-1 shows the land uses and specific facilities recommended by this study. The plan provides for development of the waterfront by segments of the river that alternately emphasize recreational and commercial uses. A narrative description of the plan follows:

Zone I River Mouth and Bay

Shelter Island. Used currently as a spoil disposal island, Shelter Island has future potential as a state tourist attraction with marina oriented recreation facilities.

East Bank

- Rivermouth. Although interim use may decline, it is anticipated that the Consumers Power Company dock will be used in the future for coal receipts.
- Intermediate riverbank between Consumers Power Company dock and government small craft facilities. This undeveloped area has potential as commercial property (bulk cargo that can utilize unit train trackage) or for recreational/marinas.

- Yacht Club and private yacht service south of U.S.C.G. and Corps of Engineers facilities. This area should remain as is, providing a base for expansion of marina development.

- Additional marina between present yachting complex and Aetna Cement. This area should experience priority development that intensifies use of the waterfront. The stone dock located north and adjacent to Aetna Cement is appropriate for interim transition use; it could eventually be replaced with a passive recreation facility/viewpoint.

West Bank

- Rivermouth to river bend. This area is under utilized; it requires a long term program for improving access (negotiations with Dow and other industrial property owners). Study of the area indicates limited need for large waterfront industrial sites and a lack of water-oriented business by most present petroleum terminal occupants. To date Dow and Amoco are the only users.

- Bay City Yacht Club at river mouth and private marina at south end of zone. Subject to above, there should be increased utilization of this area as well as future development of the marina/recreation complex at the old Corps of Engineers location. Development should be performed via basins that do not impinge upon the limited available channel.

- Reserve right-of-way to widen channel mid-point in this zone in order that it be utilized as a future turning basin to accommodate 1000' vessels; appropriate bulkhead and pierhead lines should be set.

Zone II A Essexville to GTW Bridge at Bay City

This is the area of the river with greatest commercial development potential as well as greatest demand for recreational/boating facilities. The principal means of resolving this conflict is to restrict recreational facilities to passive viewpoints in this area, and give priority to commercial users.

East (south) Bank

- Aetna Cement. Aetna Cement appears to be a viable long term industrial user. Alternately, the facility might be converted to grain; i.e., continue as waterfront industry, optional marine terminal use.

- Essexville Park. Present boat ramps are appropriate; marina would generate too much congestion in this area.

- Essexville Park to Bay City Park (especially turning basin area). This is a prime marine terminal space. It can be more intensively used for stone, pellets, fertilizers as non water dependent occupants relocate.

- Bay City Park to GTW Bridge. This property is less prime for marine terminal use. Present status of waterfront industry is appropriate, with potential future marine terminal use.

- The Defoe shipyard property. This land would be marginally useful for marine terminal use, and with proximity to downtown Bay City, it would be appropriate to convert to some recreational or tourist-oriented facility, with or without marina.

West (north) Bank

- Amoco Oil through Leonard Oil properties including Dow wharves. Dow, including its Seaway Terminal wharf is used intensively, and expected to continue so. Amoco is only other real user of port. The low utilization of these properties offers two possibilities:

  (1) relocation of tank farm(s) as required by oil company needs for expansion (doubtful) or rehabilitation of tanks to non-waterfront location served by Buckeye.

  (2) consolidation of pipelines to wharves where one or two berths will serve substantially all companies.

  Either of the above will permit other waterfront industry/marine terminal use.

- Truman Bridge to GTW Bridge. Somewhere in thi[illegible] would be the best location for a grain elevato[illegible] it would connect with Saginaw elevators single[illegible] service via Conrail. The area immediately wes[illegible] Truman Bridge is now intensively used for stone.

- Basically, the upper and lower banks of this secti[illegible] are best for marine terminal use; the central secti[illegible] (Leonard - Total) could better serve waterfront indu[illegible] The west bank adjacent to the GTW bridge could be use[illegible] to extend Defoe Park to the waterfront, but extensive use of limited waterfrontage for recreation/marinas is not recommended.

Zone II B Grand Trunk Western Bridge to South Bay City

West Bank

- Veterans Memorial Park. Improvements to the property with an additional boat launch with linkages southward are recommended. A potential tie-in to Defoe Park should be considered.

Central

- Skull Island. The woodlot could serve as a site for both active and passive waterfront activities. In addition, the Middle Ground offers possible development opportunities (mooring areas, boat launch) as a community/regional waterfront facility for transient users.

East Bank

- The James Clement Airport site and marshland located just north. This property has high potential for residential/recreational joint development. This use, however, rests on property improvements to alleviate flood level grades.

Zone III Mid River Area

East Bank

- Veterans Memorial Park along M-13 roadway. As a major recreation facility in this zone, this area could be improved by developing a public boat launch to serve regional demands.

West Bank

- The existing rail locations, creating narrow linear land parcels, rule out to a great extent any major industrial development.
- Treatment of waterfront property in this zone as a linear park would not only serve regional users, but could act as a link between the Saginaw and Bay City users. Pedestrian ways, fishing nodes and scenic overlooks are recreation nodes best suited to the property.

Zone IV Saginaw Area

West Bank

- North of I-75 bridge. The Consumers Power Marine Terminal provides an existing facility that should be maintained for water-relocated industry.
- Zilwaukee and Carrollton. Vacant properties should be acquired for park/recreation development.
- Saginaw. Vacant properties are available north and south of the I-675 interchange, and a site should be acquired for a boat launch with adequate parking and vehicle access.

East Bank

- Transient mooring facilities should be located along this zone, allowing boaters access to the Saginaw Central Business District. In addition, pedestrian linkages to tie park nodes between industry-oriented sites on the waterfront can help to continue the linkage pattern recommended in Zone III.

Note: Circulation of the draft report and development plan produced several comments and suggestions that have been incorporated in the final product as appropriate. Inevitably, subsequent developments will require updating of the plan. Accordingly, it was deemed more appropriate to append the comment of the Department of Natural Resources Fisheries Division, rather than incorporate it at this time.

> Expectation of long term improvements in the Saginaw River and Saginaw Bay fishery suggest that needs and opportunities for fishing access sites and marina facilities may eventually exceed the recommendations of this report. Future development efforts should investigate and consider the condition and potential of the fishery, and the feasibility of placing and adapting future recreational facilities accordingly.

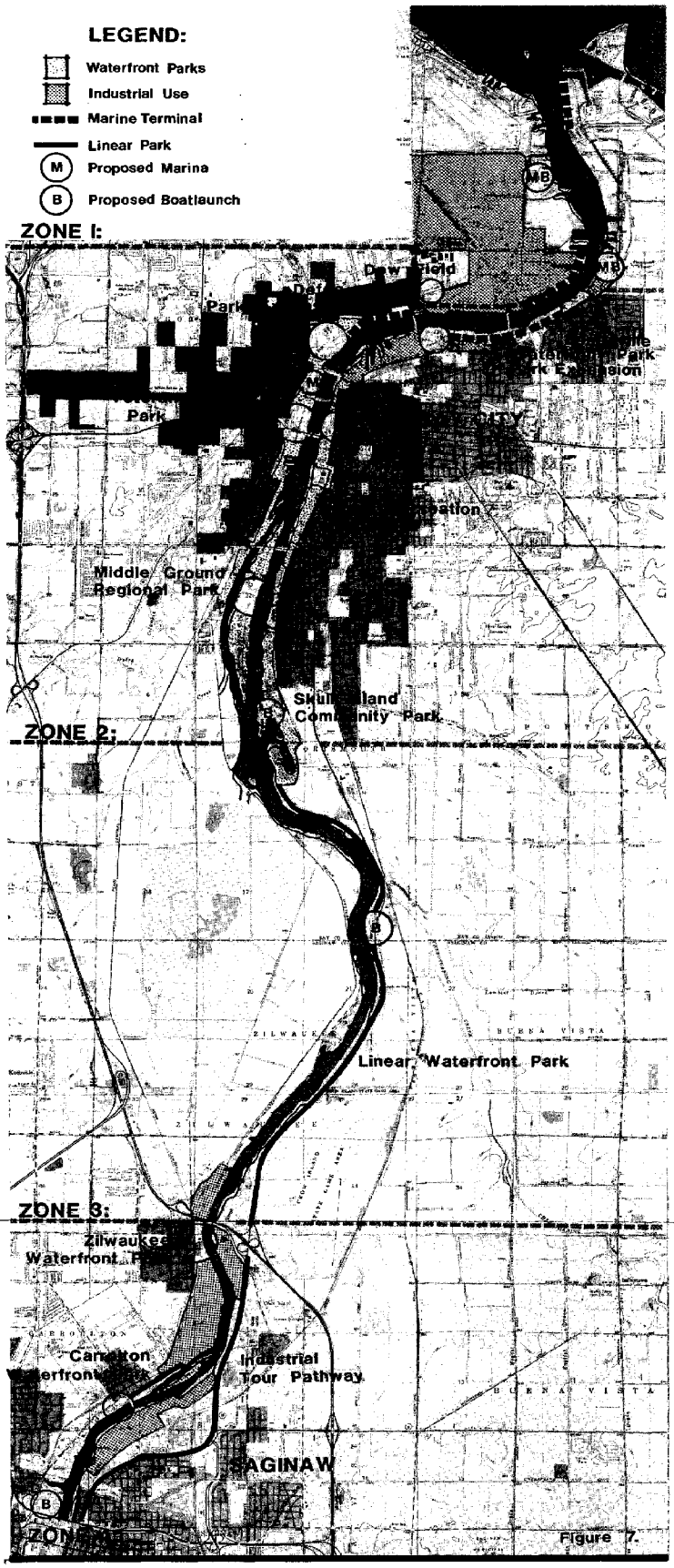

Figure 7.

Saginaw River Port Development Study

1/2 0 1 MILES

Integrated Plan

Transportation and Economic Research Associates, Inc. Johnson, Johnson & Roy/inc.

Figure VI-1
Integrated Plan

Development Plan Implementation

The preceding chapters and the integrated development plan have identified a number of needs that should be addressed in a timely manner to assure the orderly development of the Saginaw.

- The Federal Port Project. There is an immediate need to request official consideration of deepening of the river; a near-term need to provide a new mid-river spoil disposal area; a long-term need to provide additional Bay disposal areas (and integrate these with recreational development plans); and a continuing need to maintain contact with Michigan DOT and elected and appointed federal officials to assure funding of the project.

  The indicated action is to assign these responsibilities to an individual or organization dedicated to this effort, to provide the necessary initiative and follow-through. The potential benefits virtually assure a favorable benefit-cost ratio.

- Commercial Development. There is an indicated need for additional facilities to handle grain, pellets and fertilizers; a qualified need to preserve the port's general cargo facilities; and a long-run need to utilize most of the marine terminals more intensively. The immediate need is a promotional effort to attract new investment and commerce, not an infusion of public funds. Historically the facilities have been provided and operated by private enterprise.

  Historically, port promotional efforts of private enterprise have been limited to the facilities or services in which the enterprise has a proprietary interest. In small ports such as the Saginaw, the narrow range of services offered by each enterprise limit the return on promotional investment. For practical purposes, there is none. A promotional effort in behalf of all the facilities and services has more probability for some success, but there is no substitute for the incentive of proprietary interest.

The indicated action is a port promotion agency with a proprietary interest in development of the waterfront. The study outlines one such possibility. Use of the public agency as a financing vehicle (but not as a subsidy device) for the facilities that are needed is another possibility.

- Recreational Development. There is an immediate need for four boat launches along the river, two marinas (either public or private), and two downtown transient mooring facilities (presummed to be public) for pleasure craft. In addition, there is an intermediate and long-term need to expand and integrate the parks along the river into a water-oriented park system. Finally, there is need to begin the planning for two major regional recreational facilities - at Middle Ground, and the Bay Island. These will require significant investment of public and private funds.

  The funding sources for the various recreation facilities are essentially a combination of local public funds (the parks, boat launches and transient mooring facilities) and private investment, with possible state and federal assistance. County and local recreation officials are in the best position to integrate these facilities into the local settings. Their present ad hoc coordination is effective. The indicated action is to reinforce the existing infrastructure with some formal coordinating device that recognizes the interaction of recreational and commercial development.

In brief, the Saginaw should be treated as one river for the purpose of channel and commercial development, and similar to the U. S. port system, local initiative should be emphasized in recreational development. As with the port system, this recreational development should be coordinated and rationalized to produce the most effective Saginaw River recreation system.

Overall, the indicated action is to create an organization or agency to focus on channel needs and commercial development, and to supplement the efforts of the existing organizational infrastructure in recreation development. The need is for a broad-based, special-purpose agency - and the need is now. There is precedent for multi-county cooperation in regard to public facilities, specifically in connection with the regional airport and hospitals. This study recommends three county sponsorship - Bay, Saginaw and Midland - for a port agency.